REPORT RESUMES

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# PILOT PROJECT FOR IMPROVING COLLEGE TEACHING--THE FLORIDA COLLEGE TEACHING PROJECT.

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TEACHERS IN BIOLOGY, ENGLISH, HUMANITIES, MATHEMATICS, PHYSICAL SCIENCES AND SOCIAL SCIENCES AT THE UNIVERSITY AND AT VARIOUS JUNIOR COLLEGES IN FLORIDA TESTED THE VALUE OF ORIENTING COURSES TOWARD STUDENT PARTICIPATION AND AWAY FROM LECTURES. EACH INSTRUCTOR CONDUCTED ONE CONVENTIONAL COURSE AND ONE EXPERIMENTAL, LESS STRUCTURED COURSE COVERING THE SAME MATERIAL. ALTHOUGH THERE WAS LITTLE DIFFERENCE IN THE MEAN ACHIEVEMENT OF EXPERIMENTAL AND CONTROL GROUPS, THE MORE ABLE STUDENTS DID BETTER UNDER EXPERIMENTAL CONDITIONS, WHILE THE LESS ABLE STUDENTS DID BETTER UNDER CONVENTIONAL CONDITIONS. TEACHERS FELT THAT STUDENTS IN THE EXPERIMENTAL SECTIONS LEARNED MORE ABOUT MATTERS RELATED TO BUT NOT ACTUALLY A PART OF THE COURSE MATERIAL. COMPARING EXPERIMENTAL AND REGULAR CLASSES, STUDENTS FELT THAT THEY DID MORE WORK IN THE EXPERIMENTAL SITUATIONS, WERE MORE INDEPENDENT IN THEM, AND WERE MORE COMFORTABLE (BUT LESS SECURE) IN THEM. IN THE FIRST YEAR OF THE PROGRAM, STUDENT REACTION TO THE EXPERIMENTAL COURSES WAS GENERALLY NEGATIVE--IN THE SECOND YEAR, STUDENT REACTION WAS MORE POSITIVE. (THE PROGRAM AS A WHOLE, THE INDIVIDUAL EXPERIMENTS, AND THE EVALUATIVE PROCEDURES USED ARE DISCUSSED IN DETAIL.) (AD)

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FINAL REPORT
Project No. Z-001
Contract No. OE-6-10-011

# Pilot Project for Improving College Teaching
# THE FLORIDA COLLEGE TEACHING PROJECT

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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# FLORIDA COLLEGE TEACHING PROJECT

Project No. Z-001
Contract No. OE-6-10-011

Sidney J. French
Dean Emeritus of Academic Affairs
University of South Florida

June 1967

The research reported herein was performed pursuant to a contract with the Office of Education, U.S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

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# FLORIDA COLLEGE TEACHING PROJECT

# 1965-1967

## CHAPTER I

### Introduction: The Problem

It has been said that college teaching is the only profession which requires no preparation in the art of the calling. Nowhere is a prospective college teacher required to take a course or seminar in how to teach. The implication is, of course, that one who knows can teach; and the further, even more disturbing, implication is that college teaching consists in passing information from the learned to the less learned.

There was a time when such transmission was necessary, but that was before the invention of the printing press. And, incredible as it may seem, many college teachers are still apparently unaware that the products of this invention can be used by students to educate themselves. Teachers still "teach" the textbook in class; lecturing still remains the prestige symbol of the profession; even so-called class discussion is too often a form of question and answer dialogue with the teacher doing most of the talking.

Today we are moving beyond the book stage as many newer forms of mass media and automated devices give the student ever greater opportunity and responsibility for his own education. These fast coming changes permit, and in fact demand, compensating changes in the functions of the college teacher. No longer need he be a passer-on of information, a drill-master, or even a discussion leader reinforcing the textbook. Many of these things will be done for him by automated education.

What, then, is there left for the teacher to do? He might try teaching! What he has been doing quite largely is conveying information.

What, then, is teaching? It is something quite different from instructing. As Winslow Hatch has well put it, "teaching is that which takes place after the teacher ceases to pass on information." Or, as many others have put it, the effective teacher is one who works himself out of a job. It might be better phrased in reverse: The effective teacher is the one who works his students into a job; the job of developing their own intellectual resources.

College teaching then should deal with that which is not in the textbooks, does not come from the machines, nor from tapes or movies, or other gadgets. It is in essence the subtle art of listening carefully, guiding judiciously, encouraging needfully, expounding slightly, even prodding necessarily, in the effort to get students to develop their own latent intellectual self sufficiency. It can be best accomplished by doing less so-called teaching (of a traditional kind) thus allowing more time and a better environment for increased learning. Unfortunately, if this kind of definition were to be applied to college teaching across the country today, the majority of present teachers would fail to make the category.

But this is not all their own fault by any means. It is largely the fault of the long, senseless war between the graduate school Purists and the Educationists. In this war, the former refuse to admit that the profession of college teaching might be improved by some understanding of how to teach and some knowledge about how students learn.

Educationists, on the other hand, have insisted on "methods" at the expense of subject matter. As a result, many college teachers still go through life boasting of the fact that they never had a methods course and, quite certain that they know how to teach - but blinded to the many possibilities of self-improvement. Their failures are reflected upon succeeding generations of college students at high cost.

There is now, however, a gradual softening in the war, with an increasing awareness by college educators of the need for removing this blind spot. Graduate seminars in college teaching are becoming available at a number of universities. Some graduate students planning to teach in college are getting good experience as graduate instructors under master teachers. The Ford Foundation has recently recognized the problem through grants to ten major universities which will speed up work toward the Ph.D. degree and at the same time create a system of improved apprentice teaching. There are also a number of non-credit summer seminars such as that offered by the North Central Association's Committee on Liberal Arts Education for new college teachers, and the Danforth Foundation's summer workshops. A few state universities are holding short annual conferences on college teaching, while some institutional orientation programs for new faculty members are beginning to emphasize effective teaching. The Association for Higher Education, in conjunction with other national academic societies, has a committee on college teaching. Several of the professional societies have special sections on teaching problems in their field. In many of these approaches, however, the principal concern is too often with the organization and presentation of subject matter rather than with ways of inducing freerer student learning. Indeed, one gets the impression from many college teachers that the most important aspect of college teaching is still the ability to "put it over" well. Yet, experiment after experiment has shown that students learn about the same amount of subject matter whether they are taught in small sections or large, by television or live lecture, by good teachers or poor, by tutorials or independent study, - all of which suggests the oft repeated thesis that what many college teachers characteristically do in the classroom today is not at all unique and scarcely worth the human effort.

Talks, workshops, conferences, and seminars on effective college teaching are well worth the effort; they serve to open new doors for those willing to venture in. On the other hand, they are _about_ teaching, not _in_ it. We are at the stage today where teaching-learning experimentation _within_ the classroom is desperately needed if we are to keep up with the rapid changes in educational technology alone.

While there have been many experiments in class procedures there have as yet been few designated specifically to improve the college teacher by making him more aware of what good teaching is, how students learn, and how they can be made more responsible for their own learning.

It is this need which prompted the request for funds to conduct a grassroots pilot project directed toward ways of improving college teaching. The over-all purpose has been to demonstrate that a cooperative venture involving several institutions within easy reach of one another, and including several teachers from each representing different disciplines, could lead to the improvement of both teaching and learning which might serve as a model for other similar efforts and, as well, infect the institutions involved.

## CHAPTER II

### Objectives and Procedures

As stated in the original grant request and approved by the project committee the principal objectives are as follows:

(1) To discover and confirm through experience an effective program for improving college teaching, particularly among younger faculty members.

(2) To determine fresh and creative ways for making students responsible for their own learning, with findings that can be reported to the profession.

(3) To develop means of evaluating both teacher and student growth during the course of the project.

This statement of objectives, however, does not cover one of the most important aspects of the project - its cooperative nature, involving several institutions differing in size, character, and objectives, and including teachers from each of several basic disciplines. The objective of this aspect was to demonstrate that the improvement of teaching can, and preferably should, be a cooperative venture where each participant gets to visit, know, stimulate, and criticize his conferees in other institutions. This plan also avoids parochialism and experimentation in isolation, which can be lonely; each participant gains courage and enthusiasm from contact with his fellows. As it has turned out, this aspect has produced one of the most significant outcomes of the project.

Conditions for the selection of participating institutions had to be such that they were within easy reach of one another (an hour's driving time or less) to permit intervisitation and frequent group meetings. They should also differ somewhat in size, character, and objectives, and age. It was early agreed that all except the University of South Florida should be junior colleges. The final selection included, in addition to the University of South Florida, St. Petersburg Junior College, Florida College, Manatee Junior College, and Polk Junior College. Because of its size and several campuses, two teams of six each were assigned to St. Petersburg Junior College. One of these was divided between the St. Petersburg and Clearwater campuses, while the other came from the Skyway campus, formerly Gibbs Junior College, where both the faculty and the student body are predominantly Negro. St. Petersburg Junior College is one of the oldest and largest in the Florida State system of community junior colleges. Manatee County Junior College located in Bradenton, and Polk County Junior College located in Winter Haven, are among newer members of the system. Manatee has been in operation for nearly a decade while Polk is now in its third year of operation. Florida College, formerly Florida Christian College, is a small private, denominational institution of limited enrollment located in Temple Terrace, a suburb of Tampa, close to the University of South Florida. The University is also a relatively new institution which opened in 1960, has a current enrollment of some 10,000 students, and is multi-purpose in character.

The project, since its inception, has been guided by an executive committee composed of an administrator from each of the institutions involved, with Dean Russell M. Cooper serving as Chairman of the Committee. The committee has met on call, averaging four meetings a year. The selection of the participants, six from each institution, was made largely by members of the committee with the advice of other institutional administrators. The criteria for selection of participants included the following:

(1) They should be relatively inexperienced in college teaching;

(2) they should preferably be "average" teachers.

The application of these criteria was not uniform. In some cases participants were appointed who might be considered to be in a "doubtful" category as successful college teachers. This was done with the hope that interaction in the project might remove the doubt. Others were definitely in the promising class, while still others were average. Some had had considerable previous experience teaching at the secondary level, or in other walks of life, and were chronologically mature, while others were young people just starting out on their teaching careers. In a few cases, such as at Florida College, not all participant spots could be continuously filled because of the limited size of the faculty.

At the end of the first year a few participants had to be dropped because of moving to other institutions or changes in assignment. Their places were filled with new participants from the same institution and field wherever possible.

The basic discipline fields chosen for representation in each institution were Biological Science, English, Humanities, Mathematics, Physical Science, and Social Science. Here, again, certain difficulties were encountered because of differences in the programs of the several institutions. While some institutions had well-developed programs of integrated basic courses, others relied more on selections within fields or upon more typically introductory courses within a discipline. The situation within the humanities, for instance, was especially difficult because of variations in the several types of courses offered, while the program in the physical sciences failed to develop well in the first year due partly to differences in courses but more particularly to early loss of the group leader and another member.

The selection of participants was made during the summer of 1965 and the program was launched with a two-day workshop held at Clearwater Beach, September 9-10, 1965, (with hurricane Betsy hovering off-shore). At this workshop an evaluating instrument developed by the Project Office was first used with all participants, in an effort to gain preliminary knowledge of attitudes, background, and information about college teaching. The purposes of the project were presented by Deans Cooper and French, Principal Investigators. Dr. Douglas Stone, evaluation consultant, spoke on problems of evaluation of, and within, the project. General sessions alternated with discipline group, and institutional group meetings. Each discipline and institutional group chose its own leader, discussed possibilities, and attempted to outline a common acceptable and workable project. This was not achieved in all cases.

It should be pointed out that no pressure was put on discipline groups to have common projects and no attempt was made to determine in advance what kinds of projects should be delineated. Two criteria in line with the over-all project objectives, however, were emphasized. Students should be given more freedom and responsibility for their own education, and student attitudes toward their studies should be improved if possible.

Each discipline group through its leader reported to the final general session for discussion and criticism the nature of its proposed project. In case there was not agreement on a common project, each individual reported, similarly, on his proposed project.

Following the workshop session the balance of the Fall term was devoted to further perfection and completion of plans for proposed projects, including development or choice of evaluation instruments. The over-all pattern included the use of an experimental and a control section of a basic course, both to be taught by the same participant. This developmental phase involved a number of discipline group planning meetings and preparation of final project proposals, submitted to the Project Office in December, 1965, detailing the plan for each group and individual project. A student evaluation of college teaching form was given in at least one section taught by each participant late in this term as a pre-test. This evaluation, somewhat revised and with an appropriate supplement, was repeated in each section near the end of the Winter-Spring term, 1966, during which term the project was in full operation.

On March 17-18, 1966, the second workshop was held, also at Clearwater Beach. At this workshop, Dr. Ruth Eckert, Professor of Higher Education, University of Minnesota, gave the keynote address, Research in the Improvement of College Teaching, served as consultant to the groups, and summarized the session. Dr. James L. Wattenbarger, Director Junior College Division, Florida State Department of Education, also spoke on Implications of Articulation for College Teaching.

Since the term was still in operation, ending in April for most of the institutions involved, reports to the general sessions by groups and individuals were in the nature of progress reports. Discipline group sessions were devoted largely to discussion of progress and matters of evaluation.

As noted, students in both control and experimental sections were asked to respond to an evaluation instrument on college teaching near the end of the operational term. The answer sheets were machine scored, the results analyzed and summarized by the Director and sent to each participant. They are discussed later in this Report. Following the end of the term, each discipline group and each participant conducting an independent project submitted a final report including evaluation. These were compiled and bound. An introduction and summary by the Director was added, and each participant received a copy.

As a result of the first year of experimentation, some changes in direction were indicated. It was found, for example, that the Hawthorn or Halo effect seemed to operate in the teaching of some control sections, which is not surprising. Some groups felt that they had come to the end of exploitation of their chosen projects, and proposed to try others. Other groups felt that they wished to continue the same project, but with some modifications indicated by experience.

The procedural plan for the second year was much the same as for the first. The third workshop session was held September 15-16, 1966, at Winter Haven. Dr. Stanford C. Ericksen, Director, The Center for Research on Learning and Teaching, University of Michigan, served as keynote speaker, consultant, and summarizer. Results of the first year were discussed with a view to some possible general changes in direction. The first year had shown, for example, that while students in experimental sections did no better, or no worse, than those in control sections in terms of subject matter examinations and grades, many of them did seem to get "something extra." Could these "extras" be more clearly delineated? It was also felt that the comparison of control vs. experimental sections left something to be desired. In some cases it had not been possible to use this technique because of teaching assignments. With the enthusiastic approval of Dr. Ericksen evaluation procedures were shifted from the comparative use of control and experimental sections to pre- and post-testing in experimental sections only. At this session, also, it was found that all of the discipline groups, except humanities, were able to work out common group projects. In addition, some individuals planned to continue individual projects of the previous year, as well.

The Fall term was, again, devoted to perfecting plans including the development of measuring instruments for pre- and post-testing. This involved numerous meetings of discipline groups.

The projects again went into full operation at the beginning of the Winter-Spring term, 1967. Near the end of this term all students in experimental sections were asked to respond again to an evaluation instrument attempting to compare the experimental class with other classes they were taking. The answer sheets were machine scored, the results analyzed and a summary made to submit to all participants. It is discussed later in this report.

It was agreed that the final workshop should be held after the second experimental term ended since the sessions would be largely involved with discussion of results in preparation for a final project report. The two-day session was held May 11-12, 1967, at Lido Beach, Sarasota. Dr. Samuel Baskin, former Director of Program Development and Research in Education of Antioch College and presently President of Project Changeover, a program to encourage innovation in college teaching, served as Consultant. No keynote address was scheduled. Instead, each participant was asked to respond again to the evaluation form used in the first workshop and to a supplementary form designed to measure growth and change resulting from the project. Dr. Baskin was asked to summarize the session and also spoke briefly on Project Changeover. Deans Cooper and French each spoke briefly on the significance of the Tampa Bay Project.

Throughout the project, intervisitation of classes by participants was encouraged since this was felt to be one of the more vital aspects of the effort. While this took place to a considerable extent during the first year it was not as frequent as had been hoped for. The reason would appear to be that these teachers were so busy at home, and so loyal to their jobs that they could not find sufficient time for visiting. On the other hand, the frequent meetings of discipline groups during the Fall terms to perfect plans served to bring about many of these hoped-for products of interchange.

The Director visited classes in all of the institutions as frequently as possible and often met with the institutional group while on the campus. He also attended most of the discipline planning group meetings during the Fall terms.

A number of handout items were sent to all participants from time to time. Among these were Teaching Tips by W. McKeachie and Guidelines for the Aspiring Professor, Monograph C-11, South-Western Publishing Company.

One aspect of the original plan was dropped as the project progressed. This was the phase involving institutional group sessions at workshops and the functioning of these groups on the several campuses. It had been hoped that each institutional group could form a unit to spearhead interest and activity in further on-campus experimentation. While this occurred to a limited extent, the results did not seem to warrant a continuation of the effort in this manner.

The faculties of each of the institutions involved were kept advised of progress in the project by occasional brief newsletters from the Project Office and reports to faculty meetings by participants on each of the campuses. A final newsletter will be distributed following the termination of the project to summarize the results to faculties of the participating institutions. Reports of progress were also made to state-wide educational bodies by the Director and other members of the executive committee. These bodies included the annual State Conference of FEA-AHE, held at the University of South Florida, the annual meeting of Florida Junior College Presidents, and the annual meeting of the Florida Association of Colleges and Universities.

In chronological summary, the project procedures were as follows:

(1) Introductory workshop,
September 9-10, 1965.

(2) Group and individual planning period,
September-December, 1965.

(3) First project operational period
January-April, 1966.

(4) Second workshop,
March 17-18, 1966.

(5) Interim analysis and reporting period,
May-August, 1966.

(6) Third workshop, (beginning second year of project)
September 15-16, 1966.

(7) Group and individual planning period
(second year of project)
September-December, 1966.

(8) Second project operational period
January-April, 1967.

(9) Fourth (final) workshop,
May 11-12, 1967.

(10) Completion and distribution of final reports,
May-June, 1967.

# CHAPTER III

## Projects and Results - 1965-1966

As has been outlined in Chapter II the two-year project can be divided procedurally into two more or less separate experiments by years. Also, each year consists of two phases (1) the preparatory phase during the Fall term and (2) the operational phase during the Winter-Spring term. Both preparatory phases have been adequately described in Chapter II. This chapter deals with the operational phase and results for the year 1965-1966.

During the Winter-Spring operational term of 1966 each class project involved an experimental and a control section of the same basic course both taught by the same participating teacher. For each project there were developed evaluating instruments to discover resulting differences, if any, between control and experimental sections. In addition, the Project Office developed overall evaluation instruments which were used with students in both sections to discover differences in reactions.

Originally, it was hoped to equate all pairs of control and experimental sections for student ability and number. While this was possible in most cases, it became extremely difficult in a few due to registration procedures in the several institutions and to other factors. However, in those cases in which matching was possible no significant differences in results were found between these pairings and random pairings.

## Summary of Group and Individual Projects for 1965-1966

### BIOLOGY

Biological Science Group:

| | |
|---|---|
| Polk Junior College | Paul F. White, Leader |
| Manatee Junior College | Howard Hult |
| University of South Florida | Albert Latina |
| St. Petersburg Junior College: | |
| Skyway Campus | Ollie Phipps |
| St. Petersburg Campus | Starr C. Black |

Since the biology group did not agree on a common project for all participants, each participant conducted an individual project. These are considered here. The objectives of most of them, however, had much in common.

### Starr C. Black, St. Petersburg Campus, St. Petersburg Junior College

The purpose of the study was to determine whether classroom procedure based primarily on non-teacher-directed student discussion would result in a more comprehensive knowledge of scientific material than if it were presented by means of informal lectures. Of particular interest was the design to discover whether students in free discussion would be better able to organize and incorporate ideas concerning the material and respond in a superior manner to essay questions in examinations.

The course, General Zoology, required the pre-requisite of a general biology course. The two sections were matched, with the control section having a Scholastic Aptitude test average somewhat higher (71.7) than the experimental section (65.2). Each section received a lecture-laboratory outline of the course at the initial class meeting. All students in both sections were given a pre-test which was also used as part of the final examination.

The control section (29 students) was taught by the informal lecture-discussion method including slides, charts, and other teaching aids. Students in the experimental section (22) began their free discussion at the second meeting. Chairs were placed in a circle; the teacher sat outside the circle. As they gained ease in the situation, students made free use of the blackboard, charts, and slide projector; hand-raising ceased, and spontaneous conversation, frequently interrupted by students eager to contribute something, took over. The teacher's role was that of a resource person to be called upon as needed. She has remarked a number of times since that her most difficult task was to keep her mouth shut.

The sessions had something of the atmosphere of Quaker meetings. Students spoke when moved to speak; there was no assigned student leader at any session. A spirit of outdoing one another developed to a considerable extent, with students going to the library or seeking out other books to increase and improve their contributions to the group sessions. Most students participated verbally at each session.

Four one-hour examinations were given in each section consisting of 50% objective questions and 50% an essay part. Scores in these tests indicated no marked growth differences between the sections. In the pre- and post-test which also consisted of 50% objective and 50% essay type questions, growth was nearly the same for both sections. However the experimental section, which had a lower Scholastic Aptitude mean than the control section, did show a slightly greater growth in the essay portion of the test (and a smaller growth in the objective portion) as indicated in the following table.

PER CENT OF QUESTIONS ANSWERED CORRECTLY

| | Objective Portion | | Essay Portion | |
|---|---|---|---|---|
| Pre-test | | | | |
| Control section | [ 38.8 | | [ 3.5 | |
| Experimental section | [ | 37.0 | [ | 2.5 |
| Post-test | | | | |
| Control section | [ 80.8 | | [ 61.1 | |
| Experimental section | [ | 72.8 | [ | 68.2 |
| Growth | | | | |
| Control section | [ 42.0 | | [ 63.6 | |
| Experimental section | [ | 35.8 | [ | 65.7 |

These differences are not great enough to be significant and it is reasonable to conclude only that students learned about the same amount of subject matter, as judged by these tests, under either set of conditions. It is interesting, however, to note the higher starting points and the smaller proportion of growth in the objective test compared to growth in organizing and reasoning (essay test) for both sections. The instructor comments on this as indicating the weakness of objective testing for measuring real growth. It is particularly significant also to note that those students who were made responsible for teaching themselves and each other learned at least as much as those who were taught by the instructor.

Mrs. Black's conclusions are worth reporting in their entirety. "The capable students seem to be equally able to do well in either type of teaching situation. However, the able students in the discussion section, being allowed more independence, and subjected to increased responsibility, discover many extras that the lecture student misses. These "extras" or additions are probably not measurable, and this I consider the weakness of the testing means. There is no doubt in my mind that the discussion section turned out better educated "A" students, than the "A" students in the lecture group. I conclude that the discussion method promotes the able student rather than creates the able student.

"I believe that the small lecture section is better suited to students of average ability. Here they have an opportunity to question, as does the instructor. In addition, these students do not have to cope with organization of factual material as do the discussion students.

"With few exceptions, I do not believe that the discussion technique can be used to "capture" the middle of the road student. The student not only must be capable, he must discipline himself to work consistently, he must think about what he will say to the class and be ready to support his stand in case of contradiction; he must organize and he must be well read. I believe these are the major differences which have been exhibited by my classes during this study."

It is interesting to note the reactions of students to this experiment in retrospect. A boy of 18 who received an "A" in the course had this to say a year later, "...my first impression was that I was being cheated as a student since I had paid for a lecture course and I found myself caught in a round table discussion. My resentment rose to such an extreme that I headed an informal committee of students designed to air our grievances. Mrs. Black suggested that we wait a couple of weeks in order to give it a fair trial. We agreed to this, and surprisingly enough my opinion began to change. The class required a great deal of research and extra reading. For this reason I not only learned the standard basics of zoology, but also the answers to some questions which I could not find in our textbook. At the end of the term I believe I came out knowing a lot more about zoology than if I had taken a standard lecture course, but only because it stimulated my already present interest and I put more work into it."

A girl of 19 who received a "D" in the course felt this way about it. "In my opinion, this small group discussion is even more desirable in a science course such as zoology. Science is a controversial subject and the more intelligent opinions given, the more interesting and informing the class becomes. Of course the instructor must outline the material and guide the students, but the responsibility is placed wholly on the students. This type of class also provides an education major, such as myself, an opportunity to "practice" teach."

No students sampled a year later had negative feelings about the approach.

## Albert A. Latina, University of South Florida

This project had objectives somewhat similar to those of Mrs. Black - namely to increase the participation of students in their own education. The procedure followed was somewhat different, however.

The control section was taught by the informal lecture-discussion method. Students in the experimental section were divided into three groups of about 10 each. Each group included high scorers (about 400 on the Florida Twelfth Grade Test) as well as medium and low (200-299) scorers. All three experimental groups met together as a class for the first ten minutes of the period. A group leader was assigned in advance on a rotating basis for each group. The questions and materials to be discussed were outlined by the instructor, who provided copies for all students. Each group then met separately for 30 minutes, in different nearby rooms. The instructor rotated among them. The three groups reassembled for the last 10 minutes of the period to summarize the materials and consider any unanswered questions or problems raised in group sessions.

Statistically, the class gains in pre- and post-tests were slightly greater for the experimental section and moderately greater for high scorers on the Florida Twelfth Grade Test in this section. Lower performers on the Twelfth Grade Test, however, showed slightly greater growth in the control section. The over-all differences between sections were not significant.

PRE- AND POST-TEST ITEMS
CORRECTLY ANDWERED

| Fla. 12th grade scores | CONTROL SECTION | | | EXPERIMENTAL SECTION | | | |
|---|---|---|---|---|---|---|---|
| | Pre-Test | Post-Test | Gain | Pre-Test | Post-Test | Gain | Ratio of Gains |
| High scorers (356-470) | 26.0 | 33.7 | 7.7 | 26.7 | 35.9 | 9.2 | +1.5 (experimental) |
| Low scorers (232-336) | 21.3 | 28.7 | 7.4 | 22.0 | 28.9 | 6.9 | +0.5 (control) |
| Class Average (316) | 23.6 | 31.0 | 7.4 | 24.4 | 32.3 | 7.9 | +0.5 (experimental) |

Conclusions reached here are similar to those reached in Mrs. Black's experiment. Students learn about equally well in either approach. Higher ranking students do better in the experimental approach; low ranking do better in the more traditional approach. Many students in the experimental section enjoyed the experience; some also felt that they were held back by the unpreparedness of others.

Howard Hult, Manatee Junior College

This experiment had to do with the value of fast feedback exposure to obtain greater student involvement in the learning process. A class of sixty-seven students in zoology was divided into three groups for laboratory sessions. One of the three constituted the experimental group, another, the control group; the third group was not involved in the experiment. Students in the control and experimental groups were matched in terms of Florida Twelfth Grade Test scores as well as by age and sex. The same pre- and post-test was used in both sections.

The control group had a regular laboratory session once a week. The experimental group met for about thirty minutes at the beginning of the weekly laboratory session to raise written questions and problems. These were then answered by the class or the instructor. No attempt was made to structure these sessions. The developing trend was toward free discussion by the students.

Eleven students of the experimental group (61%) showed greater improvement than their paired counterparts in the control group, while five students (28%) in the control group showed greater improvement than their paired counterparts in the experimental group. Two pairs showed equal growth. The total point growth between pre- and post-test scores was 234 for the control group and 271 for the experimental group.

Some students felt that the feedback sessions interfered with their laborabory work. In the scale of 1-minimum to 5-maximum, nine students indicated interference to the extent of 4, five students to the extent of 3, and four to the extent of 1. Concerning the value of these sessions in stimulating learning, 17 said "yes"; one said "no."

The results indicate that use of this technique did improve student learning experience through greater feedback involvement. The instructor concludes that "The trend toward a discussion of the problems and questions indicated students were becoming involved and were interested in learning. On the other hand, the time devoted to these sessions did appear to interfere somewhat with laboratory success. On the basis of the grades earned in the final practical laboratory examination the paired students stood as follows:

| | EXPERIMENTAL | | CONTROL | |
|---|---|---|---|---|
| grade | No. of students | Quality point total | No. of students | Quality point total |
| A | 0 | 0 | 3 | 12 |
| B | 6 | 18 | 4 | 12 |
| C | 7 | 14 | 8 | 16 |
| D | 4 | 4 | 1 | 1 |
| F | 1 | 0 | 2 | 0 |
| | | 36 | | 41 |

Thus, the control group exceeded the experimental group in high grades earned in this phase of the course.

Ollie H. Phipps, Skyway Campus, St. Petersburg Junior College

The project objective was to compare a control section taught by lecture-discussion method using teaching aids, to an experimental section taught by a modified programmed learning technique.

Because of the limited number of students enrolled it was not possible to carry out the project.

Paul F. White, Polk Junior College

This planned project, which had to do with the in-depth study of certain topics in botany vs. the more traditional coverage, using matched student samples for each, was not completed and reported due to a teaching assignment change.

## ENGLISH

English Group:

| | |
|---|---|
| Polk Junior College | Alan Himber |
| Manatee Junior College | Helen Mallonee |
| University of South Florida | Wm. H. Scheuerle, Leader |
| St. Petersburg Junior College: | |
| Skyway Campus | Helen M. Wright |
| St. Petersburg Campus | Geraldine C. Turner |

The English group developed a common, coordinated project designed to test the effectiveness of peer (student) criticism in evaluating themes of their fellows in the Freshman English course. Essentially, the objective was to place more responsibility on students for jointly and cooperatively improving their writing skills. The control sections were taught in the usual manner, including informal lectures, discussion meetings, and/or in-class themes as well as out-of-class themes.

In the experimental sections two class meetings per week were conducted in a conventional manner while one class session per week or less, but not less than four per term, was devoted to small (3-5) student group workshops on writing with no instructor present.

Each student in these small groups had prepared a theme prescribed in length and topic by the instructor. One instructor-designated student read his theme to the small group and, as well, provided each member with a copy. A standard check list of errors prepared by the English project group was provided for each student. Listeners criticized the theme orally. At the next regular class session, summarized criticisms were submitted to the instructor by the theme reader, as was the theme in its original and revised form, to be then graded by the instructor.

Evaluation procedures consisted of comparing themes written in both the control and experimental sections at the beginning of the term and again near the end of the term. These themes were read by two readers, one, the instructor of the two sections concerned, and the other, a project group member from another institution.

While the results varied somewhat from one institution to another there is not sufficient evidence to indicate that the experimental approach was superior to the conventional approach with respect to the objectives. On the other hand, it was not inferior either. What little evidence there is suggests a slightly greater improvement in theme writing in the experimental approach.

The English group felt in general that the experimental procedure needed more structuring including, possibly, a teacher-led practice workshop in the beginning. According to the report of the participant group leader, student groups often floundered; some complained that they were not qualified to judge other student's papers; some students "goofed-off." There was general timidity about criticizing each other, and too few students took advantage of the opportunities for self-improvement. It is possible that more interaction would have taken place if the workshop groups had been larger.

Some comments of participant teachers follow:

Helen McKinnon Wright, Skyway Campus, St. Petersburg Junior College

"It would seem that the presence or the absence of the teacher in a student-learning situation which is based on the writing of themes has little to do with whether the student improves or not. However, observation showed that discussions in the control section became stimulating and interesting, whereas the experimental groups would finish their job before the end of the class period. This would seem to indicate that the student needs the assistance and presence of a teacher in order to develop logical thinking."

Geraldine C. Turner, St. Petersburg Campus, St. Petersburg Junior College

"Although comparative test results indicate that the students in the experimental group were weaker generally, their performance and achievement were parallel with those students in the control group. Therefore, the progress of the experimental group might be attributed to the advantages offered by the workshop methods."

Alan B. Himber, Polk Junior College

"The experimental class did not improve its writing or critical abilities more than the control class. Although the students proved they could occasionally detect sophisticated errors in each other's themes, they showed little (if any) carry-over to their own writing. In general, the experimental group seemed to lack direction without the presence of the instructor (this was admitted by the students themselves in discussions with the instructor). They felt they would have gained more had they not been left alone. It should be emphasized, though, that the control class did not improve its writing any more than the experimental class."

Helen Mallonee, Manatee Junior College

"In comparing the final themes of the control group with those of the experimental group, I found that the students in the experimental group seemed to be more keenly aware of the need for correct punctuation, but I found that the control group wrote better themes content-wise.

"In making an over-all evaluation of the English discipline project, I have decided that if properly constructed, and if enough guidelines are laid down for the evaluating students to follow, there is some merit in peer criticism. That it should be done, however, in small group meetings as our experiment was laid out, I am not so sure. Perhaps another year will indicate better results."

William H. Scheuerle, University of South Florida

"Each student in the experimental class has (submitted) his comments about the project. As summarized, these comments reveal that only three students were totally against the experiment, although other students suggested changes. Eight students wanted varied types of teacher supervision during the Friday meeting; they felt that they had no real authority to evaluate themes. Four students believed that as the trimester progressed the critics became lazy. Eleven students believed that the experiment had made them more careful writers, concerning punctuation and grammatical errors. Seven liked the exchange of ideas forwarded by the groups.

"Although the students, on the whole, seemingly enjoyed the experiment and although ten students in the experimental section as against four in the control section showed improvement, I do not believe that the experiment was especially successful in that it did not fulfill adequately enough the objective of the project.

"It must be stated, however, that, psychologically, the majority of the students liked the group sessions because they felt that they were able to participate more fully in the class."

## HUMANITIES

### Humanities Group:

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|---|---|
| Polk Junior College | Marilyn Gwaltney, Leader |
| Manatee Junior College | James McMahon |
| University of South Florida | John J. Iorio |
| Florida College | Joan Norvell |
| St. Petersburg Junior College: | |
| Skyway Campus | Alvin Downing |
| St. Petersburg Campus | Charles Carroll |

Plans for this project also called for the meeting of small peer groups one period (of the 3) each week. These groups were to deal with study questions relating to assigned reading provided by the instructor. Each member of a peer group was held responsible for reporting the results of the group discussion to the class at the next full session. Each peer group also received a common grade for this phase of the course based on examinations dealing with the questions discussed. Each group also had the right to "ex-communicate" any member who did not pull his own weight.

It was hoped, and expected, that among other results of random selection of small groups and the procedures involved, the good student would help the poor student and both would thus profit.

Due to the great differences in the humanities offerings of the several institutions, to changes in personnel, and to the new experimental nature of the whole basic Humanities course at the University of South

Florida, it was not possible to apply this plan to all institutions. The reports of two projects are included here.

## Alvin J. Downing, Skyway Campus, St. Petersburg Junior College

The planned procedure was followed including control and experimental sections of some fifteen each. The experimental section was subdivided into four groups and each was made responsible for researching and reporting on certain topics. These groups met separately on average once a week and with the full section at two other weekly sessions. In the beginning, the activities of the small peer groups were quite unstructured with full freedom of choice as to how to proceed. At the request of students in these groups, however, greater guidance by the instructor was provided as the course progressed.

Evaluation was in the form of common tests given to both sections. They indicated no marked superiority for either group in subject matter learned. There was, however, progressive improvement in the experimental group as its members seemed to gain confidence in handling this type of freedom. The instructor concluded that, "research, group interchange, and reports by students provide responsibilities, giving opportunity for the enhancement of the teaching-learning process."

## John J. Iorio, University of South Florida

It was not possible to carry out a project comparing a control and an experimental section since the whole Humanities course at the University of South Florida was being conducted on a new experimental basis during the second term of this year. However, since the objectives of this experiment were rather similar to those of the humanities group project, some preliminary observations on the experimental approach in this course are included.

The experiment, briefly described, is as follows: All students attend two master lectures a week. Each student enrolls in a humanities workshop in one of the included arts (theater, painting, music, creative writing) which meets once a week and is devoted to the practice of a particular art. In addition, tutorial sessions are available most of the hours of the day for voluntary participation by students. No roll is taken; the student may attend any tutorials he wishes (or none). These are designed as discussion groups around problems and ideas raised principally by students. Grades in the course are dependent on four multiple choice progress tests plus the final examination given to all sections in common.

Again, the principal objectives are to place more responsibility on students for their own progress and to encourage the desire to seek and organize knowledge with freedom. In addition, of course, some of the normal barriers between teachers and students are largely broken down since a teacher is no longer responsible for "assigning" a grade, and learning becomes more of a cooperative venture among and between students and teachers. Students may gain varying points of view by attending tutorials conducted by several different teachers.

Some preliminary student reactions were obtained by sampling 60 students in different classes near the end of the first term of operation. Following are the responses to several of the more significant questions:

How many tutorials do you attend in a week?
2 (10 students); 1 (35 students); none (15 students).

Do you sample different instructors?
yes, 15; no, 30.

Do you attend tutorials according to the known specialty of the instructor?
yes, 15; no, 25.

Do the tutorials stimulate your thinking?
yes, 11; no, 25.

Do instructors tend to lecture in tutorials?
yes, 15; no, 20.

Do you find that the tutorials make you more independent in your research and thinking?
yes, 10; no, 35.

If you had to vote between a conventional class structure and the current tutorial system, which would you vote for?
conventional, 43; tutorial, 10.

It seems obvious that the experimental program in its initial stages was not meeting its stated objectives according to the students sampled. It seems equally obvious that many students do not like such freedom, coupled as it is with responsibility for their own learning. They were not psychologically prepared to accept it. They prefer conventional security, organized regimentation, and less responsibility - a rather common human trait, unfortunately, and one which is reinforced by our educational system. Further developments in this experiment will be considered later.

## MATHEMATICS

Mathematics Group:

| | |
|---|---|
| Polk Junior College | Frederick Bevis |
| Manatee Junior College | J. L. Chittenden |
| University of South Florida | Fredric Zerla, Leader |
| Florida College | Charles Goodall |
| St. Petersburg Junior College: | |
| Skyway Campus | Wilma Holloway |
| Clearwater Campus | Ernest Ross, Jr. |

This project was directed to improving the attitude of non-science students toward mathematics by making the subject more enjoyable. It was hoped that this would create greater motivation and increase both knowledge and understanding in the general course. Several well-written non-technical books and articles on mathematics were selected to be read and discussed by the students and their instructor.

An initial attitude test, developed by the mathematics project group, was given in the experimental and control sections, both of which used the same basic textbook, and was repeated at the end of the term. The experimental sections, in addition to regular class meetings, read and discussed the other books and articles. The added books dealt with the history of numbers, men of Mathematics, and Mathematics in general selected from a list of several in each field.

The procedures in carrying out the experiment differed somewhat from institution to institution. Some made the extra readings and discussions a requirement of the course while others made these sessions (usually one a week or less) optional. Evaluation was based upon the pre- and post-attitude inventory developed by the Mathematics group of participants.

In general, the results did not support the objective that readings and discussions of non-technical materials related to mathematics improve attitudes toward the subject.

Comments and conclusions of some of the participants in this experiment are quoted below:

Wilma P. Holloway, Skyway Campus, St. Petersburg Junior College

"The change of attitude toward mathematics as shown by the initial and final attitude test was not favorable in the experimental group. Whether this was due to the extra reading and returning to the campus in the afternoon for their discussions are critical factors to be considered. There was no difference in the students' final grades. The project did not increase interest among students for the General Mathematics Course; there was no greater classroom participation; the drop-out rate was not lowered; class average grades did not rise and there was no spark of enthusiasm for mathematical reading and research."

John L. Chittenden, Manatee Junior College

"The change of attitude toward mathematics as shown by the intial and final attitude inventories was more favorable in the control section than in the experimental section: 15 went up and 9 went down in the control section while 10 went up and 9 went down in the experimental section.

"The final course grades of the control section were on the average much higher than those of the experimental section. This might well be expected from the higher average quantitative ability of the control section. (SCAT scores: 57.5 for control section; 41 for experimental section.)

"The imposition of extra reading and added class sessions for the experimental section was an added study burden and was resented to a certain degree by some of the students. This was shown by some lack of interest in attempting to read the material or to participate in the discussion periods. No great general interest in mathematics was aroused by any of the outside readings.

"The experiment this year is not considered a success. However, much was learned concerning the method of conducting the experiment and perhaps next year's attempt will be more rewarding. Although there may be some few exceptions, I do not expect that the average General Math student will ever acquire a real driving urge to dig into it outside the classroom avenues of mathematical thought, knowledge, and research. If it were otherwise, he wouldn't have taken General Math in the first place."

Ernest E. Ross, Jr., Clearwater Campus, St. Petersburg Junior College

"It is apparent that, in accordance with the three measures used, the low ratios indicated no significant difference between the control and experimental group before the experiment. It is to be noted also that there was no significant change in attitude in the students in the pre- and post-tests, nor was there any significant difference between the final grades received in the course between the two sections. Results of the student opinion questionnaire indicated that the students' reaction to the experiment was definitely adverse.

"In brief, it can easily be seen at this point that no conclusion can be reached from this study with regard to the students' attitude toward, or grades in, mathematics. There are, however, several points to consider with respect to this.

1. The Inventory of Student Beliefs and Attitudes in Mathematics is definitely not a reliable measure as indicated by the low coefficient of correlation between the two sections. No means of assessing the validity of this instrument have even been attempted.
2. The participation was quite weak. Greater involvement might have produced different results."

It seems quite obvious that students resented the extra load they were asked, or required, to assume, even though the material was supposedly non-technical and interesting in nature. It was also the feeling of the participant group that the evaluation instrument used was inadequate to indicate any real differences. The failure seems to be significant in indicating the need for a different approach to the problem of improving students attitudes toward mathematics. Obviously it should not be through requiring or expecting extra work by the students involved.

On the other hand, students in the experimental groups learned as much subject matter as those in the control groups. Failure to improve attitudes did not lower rates of learning.

## PHYSICAL SCIENCE

### Physical Science Group

| | |
|---|---|
| Polk Junior College | Marshall Ledbetter |
| Manatee Junior College | James Johnson |
| University of South Florida | H. R. Brooker |
| St. Petersburg Junior College: Skyway Campus | Frank Pierce |

Due to the early loss of two participants (one of them the group leader), to differences in types of courses in the several institutions, and to the fact that it was not possible to set up parallel experimental and control sections, this group was unable to move ahead with the proposed common project during the first year.

In general, the objectives were similar to those of the Mathematics group, to stimulate interest in the physical sciences, improve the attitude of non-science students toward science, and provide a better understanding of the role of science in society. The planned procedures involved the development of a series of lecture-demonstrations to stimulate greater interest and demonstrate more vividly some of the generalizations of science. This was not achieved. Two experiments are described.

Frank Pierce, Skyway Campus, St. Petersburg Junior College

This experiment involved two small sections (12 and 19 students) in Biological (rather than Physical) Science. The shift in subject was due to a change in teaching assignment. The control section was taught by the lecture discussion method. The experimental section was given a course and topic outline and more or less turned loose. Students volunteered to serve as group leaders. The instructor was present but did not "teach" the group.

The planned activities of the experimental group included the following:

1. Making reports.
2. Showing films and film strips.
3. Discussing charts.
4. Using the overhead projector.
5. Conducting discussion sessions.
6. Preparing tests and the final examination.
7. Conducting demonstrations.

Planned evaluation included a teacher-prepared inventory test and a standardized biology test.

Unfortunately the experiment was discontinued in the middle of the term so that no final comparisons are possible. Reactions of the students in the experimental group to the change are of some interest. Poorer students seemed relieved. The better ones seemed to regret the change back to more traditional procedures. Some of these felt that they might have done better with more specific advanced planning and, possibly, sample preliminary workshop procedures in which the instructor was also involved.

James M. Johnson, Manatee Junior College

Since there was only one section of 50 students to be taught during the experimental term it was not possible to follow the typical procedure of using a control and an experimental section. Mr. Johnson devoted considerable time to developing suitable demonstrations to be used in the course. He noted increased student interest in the course and enjoyment by many of the demonstrations performed.

## SOCIAL SCIENCE

Social Science Group:

| | |
|---|---|
| Polk Junior College | Jane Adams |
| Manatee Junior College | Harold Jenkins |
| University of South Florida | Jas. M. Swanson, Leader |
| Florida College | Almon Williams |
| St. Petersburg Junior College: | |
| Skyway Campus | Mary R. Perrin |
| St. Petersburg Campus | Harold Owen, Jr. |

This group felt that greater participation of students in their own education in social science was highly desirable as a means of gaining significant student involvement in the subject. Because of differences in class enrollments (from 18 to 180) and difference in subjects constituting the basic program, any completely common plan was impossible. Wherever it could be done, however, a substantial portion of class time was devoted to such student centered activities as committee projects on selected topics, panel discussions, debates, and student reports on topics of current interest. It was hoped to reach the shy and uncertain students by making them parts of small working groups, and to improve individual research habits by placing greater responsibility on small groups and individuals for the conduct of the course.

Although all of the projects in Social Science had the same objective, they differed considerably in procedure, making it desirable to describe some of these.

### Harold D. Jenkins, Manatee Junior College

The activities of the experimental section (65 students) centered around a series of student-directed class reports on topics selected by the instructor. Students were divided into groups, each of which met with the instructor for two preliminary sessions where basic guidelines and major research sources and methods were discussed. Each group chose a leader and held sessions on its own initiative without the instructor. In these meetings topics were more clearly defined, as were proposed methods of presentation to the class. These presentations ranged from panel reports to dramatization. A written summary report was submitted to the instructor by each group one week before presentation, duplicated, and copies provided for all students in the class. A question and answer period followed the presentation. Considerable lively discussion was provoked on many of the topics, which ranged from politics through lobbying, the social service state, recent decisions of the Supreme Court, the President as legislator, to the case of Viet Nam.

### Mary R. Perrin, Skyway Campus, St. Petersburg Junior College

The approach was similar to the above; however, the topics were largely of local, rather than national, concern, and a number of field trips were used by members of groups.

Each member of the experimental section also selected an individual topic. Group meetings and study took the place of regular class meetings; additional time for such meetings and field trips was used. Students were invited to sign up and work with a political party, attend court and council meetings, interview public officials, make public opinion surveys, and attend meetings, on invitation, of civic organizations. The last five weeks of class time was used to present the projects to the class.

### Almon Williams, Florida College

The experimental class gave its own lectures according to an outline of topics prepared by the instructor. The instructor gave only those lectures which the limitation of either class enrollment or class conditions required. Each student prepared himself through readings and research on a certain lecture topic in the course outline. The control class was taught by the informal lecture-discussion method.

In this case comparison of the control and experimental sections was made more difficult by the fact that one section (the experimental) met three times a week while the other was an evening class meeting for three hours one day a week. Grades in the two sections were about the same. The experimental section showed somewhat greater gain in College Board scores than the control section.

In general, evaluation in the Social Science projects showed no marked differences between the control and experimental sections in knowledge gained as tested by course examinations. On the other hand, it should be noted that students in the experimental sections became much more involved in in-depth study of certain topics and, at the same time, maintained their position in the general knowledge required in the course.

There was, also, on the part of many students in the experimental sections considerable enthusiasm for the procedure, and for involvement in small group interchange.

Some comments and conclusions of these participant teachers follow:

Harold D. Jenkins, Manatee Junior College

"In terms of achievement as measured by the examinations, there seemed to be little if any difference between the performance of the control and experimental sections. This is in addition to the fact that a greater number of students withdrew from the experimental section during the first week, presumably when they saw the requirements of the project. The shy student continued to be inhibited. This manifests itself in the tendency of several students to hide behind a written report, and say nothing unless directly asked. This often resulted in a lack of rapport, although stress was placed on "talking with" the class rather than reading a report. In the area of research skill development, several students mentioned that they received valuable training, although usually limited to their individual report. Because of the division of labor within the group it was evident that many students did not progress beyond the limits of their immediate topic.

"Although a few students made what I would consider outstanding presentations, there were numerous instances where the significance or relevance of the research was not evident to the student and thus the class was presented with disjointed material within which no hierarchy of significance had been established."

Mary R. Perrin, Skyway Campus, St. Petersburg Junior College

"1. The experimental group became more involved in the learning process.
2. A wider range of subjects was covered by the experimental group than by the control group.
3. In the experimental group there was a sense of reality in the classroom procedure.
4. Students found the project approach more challenging than the lecture approach.
5. Many students expressed the wish that there be a combination of the two methods.
6. Use of the project method was at times rather time consuming and rather difficult to fit in with the regular teaching requirements."

## COMMENTS AND CONCLUSIONS

Is quite evident that there is considerable variety in the nature of the projects attempted during the year. It is equally evident that two common and interrelated objectives prevailed in all of them - to give students greater responsibility for their own education through greater self-involvement, and to improve their attitudes toward their studies.

From a highly student-centered approach through very modest modifications of conventional patterns, one thing stands out quite clearly - students in experimental sections did not learn more subject matter than their counterparts in conventional control sections.

The whole project could, therefore, be written off as a failure and we could happily return to the less arduous task of traditional approaches to teaching. This would be true if the objectives of the project were only to discover who learned the most subject matter most efficiently.

Viewed in another way, however, it can be concluded that the experiment was highly successful. Better students did better when given more freedom, and in spite of interfering with traditional ways of learning (including student-security in the teacher-directed class) students in experimental sections learned as much subject matter as their counterparts. This suggests what many have observed before, that students will learn subject matter in spite of their teachers and their varied ways of teaching. They did so in this instance, while assuming greater responsibility for their own learning and gaining greater group involvement. What is the significance of this? It seems to mean that normally we over-teach; that we work too hard at teaching and not hard enough at providing the opportunity for self and group learning.

While it is true that many other types of experiments such as programmed learning, independent study, and the use of television, also come to the conclusion that students learn about the same amount whatever the instructional means, this project introduces another concept of some significance - that of peer group interaction, of students teaching each other. It strongly suggests the need for further exploration in this area as well as for further efforts toward less teacher-controlled effort and more student-led activity.

Are there values of "extras" in some of these experimental approaches which we cannot presently measure? There are many opinions, at least, on the part of the participants that there are such values, but that, as yet, we have no ways of knowing just what they are or how they are attained. As Mrs. Black well put it, "There is no doubt in my mind that the experimental section turned out better educated A students than the A students in the control section."

There are, of course, obvious and unavoidable weaknesses in the experimental design. Involved students were carrying, on average, only one-fifth of their course work in experimental classes. How much were they affected by this small segment of greater freedom and responsibility to learn? It was upsetting to some of them to be plunged into a new pattern for such a brief exposure and then returned to normal channels for the major part of their academic job. Many students, it seems, still like to be told what to do and how to do it; they are used to this and feel more comfortable in the traditional "system."

Certainly, there was not even an approach to saturation in either freedom or responsibility. A better demonstration pattern might have been to involve these students in experimental approaches to learning for all of their course work during a full term. This pattern was not possible under the circumstances of the experiment.

Similarly, many of the participant teachers experienced difficulties in making the necessary adjustments, applicable to one class only of several they were teaching at the time. The lesser fraction of their time and energy involving, as well, difficult psychological and physical changes in conventional teaching behavior. Then, there was the Halo or Hawthorn effect in operation in a number of cases, which necessarily affected comparisons.

FOUR GENERAL CONCLUSIONS SEEM JUSTIFIED:

I. AS MEASURED BY TEACHER-PREPARED EXAMINATIONS, STUDENTS IN EXPERIMENTAL SECTIONS LEARNED AS MUCH SUBJECT MATTER AS THOSE IN MATCHED CONTROL SECTIONS, BUT LITTLE MORE.

II. THE BETTER STUDENTS DID BETTER UNDER EXPERIMENTAL CONDITIONS WHILE THE POORER STUDENTS DID BETTER UNDER CONVENTIONAL CONDITIONS.

III. MANY PARTICIPANT TEACHERS FELT THAT THE BETTER STUDENTS IN THE EXPERIMENTAL SECTIONS GAINED AN EXTRA SOMETHING WHICH THOSE IN CONTROL SECTIONS DID NOT GAIN.

IV. THE USE OF PEER GROUPS WITH STUDENTS TEACHING, AND LEARNING FROM, EACH OTHER APPEARS VERY PROMISING FOR FURTHER EXPLORATION.

## Student Reactions

As has been noted earlier, students involved in the project were asked to evaluate their teachers as well as the project in which they were involved. Two step-wise procedures were used. In December, 1965, before the first operational phase of the project started, students in at least one section taught by each participant were asked to respond to a Student Evaluation of College Teaching form prepared in the Project Office. These responses were machine scored and analyses were made. Near the end of the operational term, students in both the control and experimental sections were asked to respond to this form again as well as to Supplemental forms I and II of Student Evaluation of College Teaching. Supplemental form I was also machine scored and analyzed.

What did these students think of their participant teachers prior to the beginning of the operational phase? A composite summary of answers indicates that their teachers had good attitudes toward students, enjoyed teaching, maintained good class discipline, were quite willing to have students disagree, and to admit that they also did not know all the answers. They had a good sense of humor, did not use sarcasm or show favoritism, and tried to help slow learners.

On the other hand they tended to ignore shy students; their teaching was not highly inspirational; they were rated collectively as average teachers.

Their teaching procedures were well organized; courses were a bit dull; lecturing was satisfactory; in the main, students did not get by without "cracking the book"; grading was just; "discovery" was only modestly encouraged; these teachers were neither strongly authoritarian nor permissive in teaching methods. (It is likely that many students did not understand these terms.)

There was little participation by students in their own education; teaching aids were not much used; independent study was not encouraged.

Also, according to their students, these teachers were cheerful, committed, well educated, not greatly interested in community or world problems, not moody or worried about life, did little complaining, and were teaching because they liked it. Compositely they satisfied their students and were neither superior nor inferior.

Are there qualities which good teachers have in common? To discover if there were, and what they were as students judge them, seven teachers with composite ratings above 4 (mean 4.4.) on a scale of 5 were compared with the same number of teachers having composite ratings below 3 (mean 2.9) in responses to the item, "Is among the few best instructors I have had in college." These students agree well on many of the qualities of good teachers. They excel in the following:

Presentation of subject matter
Getting student participation in class
Encouraging students to raise questions in class
Making the course "live"
Lecturing
Maintaining strict discipline, but at the same time making students feel relaxed in class
Getting students to go beyond the assignment
Enjoying the class
Making students feel it is their class
Bringing out shy students
Teaching so that students can get by without "cracking" the book
Liking students as human beings
Grading fairly in examinations
Presenting students with a well prepared plan of the oourse in the beginning
Being well educated outside the field of specialization
Being interested in community, national, and international problems
Being dedicated to teaching
Being cheerful
Putting students "on their own" to discover things rather than "handing it out"

The response to the underlined item is a give-away. Among other things, students seem to qualify as good teachers those who simplify the lives of their students by "handing it out" in class. In this respect at least, student opinion of what constitutes good teaching does not necessarily agree with what teachers regard as good teaching. A rather striking incident emphasizes the point. The situation must be anonymous but it is true. The Director of the Project visited classes of the participants as often as possible. In this particular visit, which took place before the operational phase of the project started, the teacher was doing straight lecturing from notes, and in a strident voice. Heads of students were bent over desks; fingers moved pencils across notebooks at high speed. The only interruptions were occasional requests to repeat a statement when a student could not keep up. The material of the lecture was largely covered by the textbook but there were a few additions of even greater detail. This was the way this teacher taught.

Making a mental note, the Director decided to check on the rating given by students in the Student Evaluation of College Teaching to this particular teacher. Naturally, he expected it to be low. Instead, he found it to be high, very high! Why did students rate this teacher so high? He examined ratings on other items and discovered that these same students felt quite decidedly that they could get by without "cracking" the book. Why not? Everything needed was included in the lectures; all they had to do was cram their notes to pass the course. To these students orderliness, regularity, passivity and security on their part seemed to equate with a high order of teaching.

It is perhaps quite normal that many students see good teaching as orderly progress and security under which they need exercise only a minimum of self-responsibility. This is what they have been raised on. The teacher who insists on a high degree of self-responsibility on their part confuses them. How, then, do we go about increasing student independence of the teacher, still keep the student comfortable but excited, and ensure that real self-learning is taking place? As the results of this project indicate, we can do it successfully with the better student, about equally well with the average student, and not quite so well with the poorer student. We may need to explore further the possibility of teaming the better and the poorer students in self-directed peer activities. Can we, in general, successfully increase the emphasis on learning by decreasing the emphasis on teacher-led instruction? This is one of the most critical problems facing American education today at all levels. The over-all results of this project toward such ends are definitely encouraging.

Near the end of the Winter-Spring term, students in the experimental and control sections were asked to respond to the same form previously used (Student Evaluation of College Teaching) and, as well, to Supplemental forms I and II designed to compare reactions and attitudes of students in control and experimental sections. Only supplemental form I was scored and fully analyzed at this time since it was felt that little new information would be forthcoming from the evaluation form previously used.

The following table summarizes responses to a few of the more critical items. Where the difference in response between control and experimental sections was less than 0.10 on a scale of 5.0 no value is recorded. It may be noted in passing, however, that even these small differences all favored the experimental approach. Each item had a range of 5 points.

Mean differences in Response of Students in Experimental and Control Sections to Selected Items concerning the Project

(+) Experimental Sections gave higher rating to item
(-) Experimental Sections gave lower rating to item

| | DISCIPLINE | | | | |
|---|---|---|---|---|---|
| Intent of Item | English | Biology | Social Science | Mathematics | Humanities |
| This class is different (5) from other classes; not different (1) | +0.60 | +1.10 | +1.00 | +0.20 | - |
| Student participation in class is much (5); little (1) | - | +0.40 | +0.70 | +0.17 | - |
| Learning is more (5) or less (1) in this class | - | - | - | +0.27 | +0.25 |
| Kinds of things learned are more (5) or less (1) worthwhile | +0.22 | +0.15 | +0.23 | - | +0.15 |
| Ways of learning are more (5), or less (1) helpful | +0.16 | +0.20 | - | - | - |
| Feel more (5) or less (1) secure in this class | - | +0.20 | - | - | -0.40 |
| Feel more (5) or less (1) comfortable in this class | +0.30 | - | +0.33 | +0.20 | -0.40 |
| Do more (5), or less work in this class than in others | +0.20 | +0.60 | +0.60 | - | - |
| Feel more (5), or less (1) independent of teacher in this class | +0.36 | +0.40 | +0.47 | - | - |
| Like (5), dislike (1), method of teaching | +0.30 | - | - | -0.13 | -0.20 |

The responses in the Humanities can be disregarded since they are affected by the University of South Florida experiment in this field and represent only one other fully carried out and reported project. They seem, however, to substantiate in some degree the kind of bewilderment and resentment of the University of South Florida students sampled, and noted previously in this chapter. Results in Mathematics also moderately reflect student resentment at having to do extra work in the experimental sections, even though students apparently do not interpret this as "more work in this class."

The results in the other three disciplines show definite, even though fairly modest, positive differences between control and experimental sections. In English, students do not seem to interpret their participation in small writing workshops as increased "participation in class." This is due, no doubt, to the inadequate wording of the item to cover this situation.

It is clearly evident that students in these three disciplines do not feel that they are learning more in experimental sections, a conclusion supported by the participating teachers. They are definitely aware of the differences between the conduct of the experimental classes and their other classes; they participate more in class (except seemingly in English, as noted above). The ways of learning are more helpful; students feel more comfortable (except in Biology); they definitely do more work, and definitely feel more independent of the teacher.

Yet, withal, they are not enthusiastic about the experimental approaches. The exception, interestingly enough, is in English where the participant teachers had the feeling that their students did not like the approach.

Although the mean differences are relatively modest they do confirm in all cases the observations and findings of the several participant teacher groups and individuals.

These composite comparisons, of course, tend to level out differences between individual teachers, some of whom were more successful than others in carrying out their experiments. A few examples of more successful teachers illustrate some of these differences from the means.

Students in the experimental section of teacher A, as compared to those in the control section felt strongly (+0.90) that the kinds of things learned were very worth-while as were the ways they learned them (+0.60). They felt very comfortable (+1.10) and very independent (+0.50).

Students of teacher B felt that the class was very different (+1.30); they participated more (+0.70), and they liked the approach (+0.70).

Students of teacher C felt that the class was moderately different (+0.20); they did more work (+1.39), and felt very independent (+1.20). Yet they disliked the approach (-0.70).

There were, of course, balancing cases in which differences were slight or negligible due to lack of sustained attempts to experiment or, in some cases, to the fact that the instructor was by nature an experimental teacher in all of his teaching, or even to the Hawthorn effect in which some of the experimental ideas carried over, even if unconsciously, to the teaching of control sections.

In a number of other items to which students responded in Supplement I to Student Evaluation of College Teaching there was virtually no difference between experimental and control section means, except for a moderately more favorable change of attitude toward English by the experimental section (+0.30). The experimental sections showed no greater desire than the control sections toward being put "on their own" as opposed to being taught by the lecture method except, again, in English (+0.20). Both groups, however, moderately preferred the lecture approach to being "on my own." Both groups felt about equally that the teacher's most important function should be to help students find things, rather than to lecture, ask questions, lead discussions, or help develop a sense of inquiry. Yet, both moderately preferred the lecture approach to others. Students, it seems, like other human beings, can easily reconcile seeming inconsistencies of choice.

In the open-end Supplement II, students had the opportunity to "sound-off." The many of those who availed themselves of the opportunity in both experimental and control sections were almost uniformly complimentary about their teachers. The majority of them liked being in the experiment. Some disliked it, a few very strongly, such as the student who wrote, "This project I like least; and getting out I like most."

A few typical and atypical but interesting statements, some of which are slightly edited for the sake of brevity, are included below. The letter "E" indicates that the student was in an experimental section; the letter "C" refers to a control section.

E The worst I could say of this class is that I couldn't smoke.

E Great class! Make this project compulsory for all classes - the overall results might well be interesting.

| | |
|---|---|
| E | I do not like the idea of a student being put on his own. |
| E | I don't care for the experimental. |
| E | It helped students to be independent. |
| E | I disliked being put in this class unknowningly. |
| E | Discussion among students with guidance by teacher made course more interesting. |
| E | I wanted a lecture class. We often missed some highlights. Make it elective. |
| E | In a lecture class the student knows what is expected of him in a test; in a discussion the subject gets out of hand. |
| E | Increased my motive for learning. |
| E | Gave me a chance to become familiar with many different books. |
| C | We were the control group, looked down on for not doing a lot of outside reading. |
| E | I like the way we found out how we got that 2 + 2 = 4 and things like that. |
| C | I like this course; it has given me more independent feelings. |
| C | I have a wonderful teacher. |
| C | I like the prof. He makes it interesting. |
| C | This class had the best teacher I have ever had. |
| E | A friendly class with humor; interesting, and not put on the spot. |
| E | Like group discussions and panels. |
| E | Don't like group grades. |
| E | Don't like experiment. |
| E | Outside groups were very helpful. |
| E. | The teacher, not the students, should lecture. |

STUDENT REACTION TO THE PROJECT CAN BE SUMMARIZED AS FOLLOWS:

(1) THEY FELT THERE WERE POSITIVE VALUES IN THE EXPERIMENTAL APPROACH SUCH AS THE KINDS OF THINGS LEARNED AND THE WAYS OF LEARNING THEM.

(2) THEY FELT MORE COMFORTABLE IN THE EXPERIMENTAL APPROACH, BUT NOT MORE SECURE.

(3) THEY DID MORE WORK IN THE EXPERIMENTAL APPROACH.

(4) THEY FELT MORE INDEPENDENT IN THE EXPERIMENTAL APPROACH.

(5) THEY FELT THAT THE EXPERIMENTAL APPROACH WAS QUITE DIFFERENT FROM THE APPROACH IN OTHER CLASSES.

(6) THEY DID NOT LEARN MORE SUBJECT MATTER IN THE EXPERIMENTAL APPROACH.

(7) THEY DID NOT PARTICULARLY LIKE THE EXPERIMENTAL APPROACH.

## Over-view of the First Year

As indicated, the first year of the project can be regarded as a successful demonstration of placing more responsibility on students for their own learning. Few of the projects were daring in nature. Most of them were modest modifications of conventional patterns. Putting students on their own, either in small groups or individually, for one period out of three per week does not equate to a great deal of either independence or daring.

Nevertheless, even with such limitations as were present, the project in its first year moved successfully toward its objective of demonstrating that greater student responsibility for his own education is not only possible but carries with it extra values which are deemed desirable. These, as yet, cannot be specifically identified or measured in terms of what they are, or through what processes they are best attained.

# CHAPTER IV

## Projects and Results - 1966-1967

The experimental classes for the second year of the Project went into operation during the Winter-Spring term of 1967 (January-April). Some of the discipline group projects were continued, using the same objectives as in the previous year, while others were changed. In addition, a number of individual projects were carried on. Both discipline group and individual projects are reported by disciplines.

### BIOLOGY

Biological Science Group

| | |
|---|---|
| Polk Junior College | Paul White, Leader |
| Manatee Junior College | Howard Hult |
| University of South Florida | Albert Latina |
| St. Petersburg Junior College: | |
| Skyway Campus | Ollie Phipps |
| St. Petersburg Campus | Starr C. Black |

At the workshop session in September, 1966, the Biology group agreed on a common project. It was to do a survey of some of the common basic problems facing biologists teaching general education biology. Problems were gathered by participants as well as by other biology teachers and students. Some participants experimented with solutions in class. At frequent meetings of the group these problems were discussed and classified. They were divided into two categories; I, Problems of Teaching Methods; II, Problems in Teaching Biology. Problems are posed and suggested ways of solving them are listed. As is pointed out by one of the group, many of the problems posed in category I such as hints on student-led discussions are applicable to other teaching areas.

Obviously, this project is not subject to evaluation. It does, however, contain many useful, carefully thought out, suggestions for improving college teaching. The complete text of the report is included as appendix F.

In addition to the group project several informal individual projects were carried on by members of the Biology group. Albert Latina continued his experimental class procedures of the previous year; Paul White carried on a class experiment quite similar to that of Starr Black's student-centered class of 1965-1966. The results were equally promising.

## ENGLISH

### English Group

| | |
|---|---|
| Polk Junior College | W. B. McGough, Leader |
| Manatee Junior College | Helen Mallonee |
| University of South Florida | Otis Wragg |
| St. Petersburg Junior College: | |
| Skyway Campus | Helen Wright |
| St. Petersburg Campus | Geraldine Turner |

The English group changed its group project from peer-group workshops in writing to the attempt to improve student attitudes toward the interpretation and criticism of literature. The principal objective was to seek better methods, procedures and techniques with which to help students achieve greater enrichment of life and personal growth in aesthetic and human values through an increased capacity to interpret and judge literature independently. "We have wanted to see if the way we presented it was changing attitudes so that students would read more, would read more critically, and consequently would understand and enjoy literature more."

The assumptions were that "literature is a humanizing force," that the "critical reading of it benefits the individual in providing enjoyment, insight, and personal growth throughout life," and that literature "has a valid place in the freshman composition course as a valuable source of ideas for writing."

To determine changes of attitude a pre- and post-test was used and is included as appendix G.

Personal interviews, diagnostic tests, and written essays supplemented the pre- and post-tests. Additional means of determining change and of correlating this with general ability were used by a number of the participants.

W. B. McGough found that the degree of enjoyment of literature is closely related to the ability to read and comprehend even though this does not always insure enjoyment of literature. Inability to read and comprehend, however, appears definitely to insure non-joyment.

Of students scoring in the upper stanines of three sections of English 102 involving 356 students there was a small but definite change toward a more favorable attitude. 78.6% of these students had a favorable attitude toward literature in the pre-test as compared with 84% in the post-test. In the lower stanines the situation was reversed, 19.6% vs. 14%. There was no change in the middle group.

Geraldine Turner used a somewhat different approach. The methods were the same as used in other classes. Interviewing was not done. Tests and comments were placed in sealed envelopes and not analyzed until grades had been issued. She used her own pre- and post-test (the English group attitude test was not quite ready for use at the beginning of the term).

Analysis indicated that 182 responses were unchanged; 30 were changed in a less favorable direction; 173 were changed in a more favorable direction. The class included 25 students and there were 420 possibilities for change in the test. It might be concluded from these statistics that there was a 40% improvement in attitude toward literature. This was not broken down in terms of student ability. Indeed, one of her conclusions is that "the capacity to change does not appear to be closely linked to ability. The better student has few negative responses in the beginning and consequently may change less....The weaker student may change more but his changes are erratic."

From the student responses to specific items, Miss Turner draws several generalizations, a few of which are listed here.

> When reading a story, they look at the story itself and are rather independent of teachers and friends in their judgment of the story.
>
> They are attracted to well-known authors and authors their friends and teachers talk about.
>
> Their criteria for judging a "good" story, novel, or play changed only slightly, for many had valid elementary judgments when they came into the course. But their identification with characters has been broadened for the better.

Students also submitted subjective written evaluations. Of those responding 14 said they had a more favorable attitude toward literature and 5 a less favorable attitude.

Some of Miss Turner's conclusions as well as suggestions concerning the experiment follow.

> Although a large majority said that their usual attitude was to "endure" literature, many other favorable responses contradict this statement as valid evidence. Also their favorable answers are more consistently borne out in the two tests and in their personal comments than are their occasional unfavorable responses in all three evaluations. They are sometimes more purposeful in their minds and hearts at the end of the term than they seemed to be in their deeds throughout the term.

From responses several suggestions can be made:

> The atmosphere of a class using literature as a source of enjoyment and as a source for ideas for writing should be more relaxed so that half do not feel lost, stupid, or nervous.
>
> The selections should be better suited to their tastes, needs, and personal growth.
>
> The pace of the presentation of the literature might be slowed down by going deeper into fewer selections.
>
> More meaningful and inspiring creative moments may be experienced by them through more class discussion of their ideas rather than through the explanations of the teacher and the critics.
>
> The teacher must be imaginative in method and technique to help the young keep their minds on the literature being studied.

Helen Mallonee adopted still a different approach, using a control and an experimental section. The difference between the two was only in terms of the amount and type of literature used. The number of essays read in the regular English essay text was greatly reduced in the experimental section. In their place was added a collection of short stories, poems, dramas, Steinbeck's, The Red Pony, and Robert Penn Warren's, All The King's Men: These were discussed in considerable detail with respect to style, tone, metaphor, symbolism, contrasts, etc. Instead of writing expository themes dealing with personal experiences, observed attitudes, or current problems, students in the experimental section did analytical or evaluative themes on their readings.

No written evaluations were made of the two sections. Mrs. Mallonee's personal conclusions follow.

> In terms of grade comparisons both groups came out with about the same number of A's, B's, C's, D's, and F's. However, the students in the experimental section displayed a much greater interest in classroom discussion and exhibited more noticeable enthusiasm in writing

themes. Though the themes of the experimental group had as many, if not more, mechanical errors than those of the control group, the themes of the former were by far the more meaty and yeasty in content. The students in the experimental section showed a greater inclination toward taking a firm stand on controversial matters, arguing vehemently on various issues in Robert Penn Warren's All The King's Men. In classroom discussion, as well as in their written compositions, the students in the experimental group exhibited a greater degree of originality in thought, often pursuing an analysis in depth of some particular symbol in the piece of fiction chosen for interpretation.

From the project the conclusion was reached that fiction reading should be a part of both the first and second trimesters in the freshman English program and should be used as a basis for theme writing.

## Individual Projects in English

In addition to the English group project, Miss Turner also continued with the previous year's project involving peer group workshops in writing. Some procedural changes were made including more preliminary guidance to the workshops by the teacher, peer appraisal of themes done by all workshop members at each session, use of a simplified check list of errors, and greater emphasis on revision of papers.

The final grades of individual students in the experimental section were compared with individual students of similar ability in three other sections of the course. Eight students in the experimental section did better than their counterparts in other sections. Two did worse. Nine did the same.

Student comments were rather similar to those of the previous year. Some liked and profited from the experiment; some disliked the idea of being "taught" and criticized by other students. On the whole, however, these students were more favorable to the plan than were those of the previous year, probably because of more careful structuring.

Some of Miss Turner's conclusions follow.

> The workshop seemed to give the conscientious students of various abilities a chance to perform better than those of equal ability and conscientiousness in other classes. Weaker students seemed to achieve better grades in the experimental class probably because of the help which they received from better students in the workshops. A few "average" students in the experimental class did better than more capable students in other classes.
>
> In the workshops both the peer pressure and the incentive to improve a grade are real and respectable motivating forces. Students seem to respond and cooperate if they know their peers are going to review their work.
>
> The workshop method, in spite of some disadvantages recognized by both students and instructor, has advantages that outweigh the disadvantages. It seems to present an important opportunity to the student which he is denied in traditionally conducted classes, that of becoming a better critic of others' and of one's own writing. The movement toward being independent of the teacher is undoubtedly the psychological basis for the student's resistance to the method. He is taking a painful but necessary step toward being on his own.

It should be noted that the conclusions reached here are considerably more optimistic about the peer writing workshop plan than those of the previous year. This approach deserves further experimentation.

Otis Wragg was not teaching Freshman English during the second trimester. His project is a continuing one involving a functional approach to literary criticism and using discovery and comparisons as motivating factors.

## HUMANITIES

### Humanities Group

| | |
|---|---|
| Polk Junior College | James S. Keating |
| Manatee Junior College | James McMahon |
| University of South Florida | John J. Iorio, Leader |
| Florida College | Eleanor Weaver |
| St. Petersburg Junior College: | |
| Skyway Campus | Alvin Downing |
| St. Petersburg Campus | Floyd D. Funk |

John J. Iorio. The University of South Florida's experiment in its Humanities course was described in Chapter III. Briefly, students are expected to attend one lecture and one activities workshop a week. Tutorial discussion sessions are also available to them at various times on an optional basis.

A survey of student opinion made near the end of the term indicates considerable change in attitude from the previous year . Students attended about the same number of tutorial sessions per week, the sampling of instructors was about the same, and attendance at tutorials according to the instructor's specialty was about the same.

There was considerable increase in the stimulation of thinking through tutorials

| 1966 | 1967 |
|---|---|
| yes 11, no 25 | yes 24, no 23 |

Students now felt more strongly that the tutorial system made them more independent in their research and thinking

| 1966 | 1967 |
|---|---|
| yes 10, no 35 | yes 27, no 24 |

If they were to vote on a conventional vs. the tutorial plan they still favor the conventional plan, but by a smaller majority

| 1966 | | 1967 | |
|---|---|---|---|
| conventional | 43 | conventional | 39 |
| tutorial | 10 | tutorial | 21 |

Again, these results appear to indicate that students dislike freedom coupled with responsibility for their own education. On the other hand, definite progress has been made in moving them toward acceptance of this concept.

Mr. Iorio comments as follows about the experiment:

> More time is needed to study the program, and methods of evaluation need to be further developed.

> Superior students still seem to enjoy the freedom while mediocre students seem to feel insecure. Here the program could be bolder. The limited freedom in the over-all program is enough to disconcert the badly prepared, unmotivated student while it is not sufficient to challenge the superior student. An experiment in the direction of greater independence for the superior student might prove of some significance in a more flexible over-all pattern. It is significant to note that the workshops enjoy enthusiastic approval. Students indicate that the workshops are an area of independence free of the crime and punishment aspect of the grading system. They point to the fact that workshops assume at the outset participatory experience on the part of the student. If there is to be more experimentation in the Humanities program, it could very well come from the lessons of the workshops.
>
> Students interviewed a year after the introduction of the experiment in Humanities while not showing overwhelming enthusiasm for the tutorial experience do indicate a more generous disposition towards innovation and experimentation in other courses. Of the ten students personally interviewed eight of them felt that their improved attitude toward experimentation was conditioned by their participation in the Tutorial program.

Alvin J. Downing's experiment was conducted through use of tutorial procedures, using a control group and an experimental group of the same class. Both groups were started out together using conventional teaching procedures.

The experimental group was then released from class attendance and members were encouraged to come to the instructor whenever they had reached the limits of comprehension to raise questions, indicate areas of confusion and limitation. Questions raised by members of the tutorial group were often used as a basis for teaching both groups. The tutorial group selected a leader and frequently met by themselves for discussion.

Grades did not indicate any superiority of one group over the other. However, as Mr. Downing notes, "It does appear that if properly motivated and guided, students are capable of helping themselves through their own efforts."

J. S. Keating's experiment, conducted in a Music Humanities course, was quite different from the humanities group project. It was to establish with some degree of accuracy, the effects the amount of time used in taking tests has on test grades. Five objective tests were administered during the term and the time required for each student to complete the test was recorded. The attempt was made to correlate the time with the Florida Twelfth Grade Test scores of the students involved.

Mr. Keating's conclusions (in part) are as follows:

> The time required in completing tests has very little, if any, effect on the grade achieved.
>
> The only correlation found between the Florida Twelfth Grade Test scores and course grades that reflects any appreciable degree of accuracy was found for those making extremely low scores on the Florida Twelfth Grade Test.

## MATHEMATICS

### Mathematics Group

| | |
|---|---|
| Polk Junior College | Frederick Bevis |
| Manatee Junior College | J. L. Chittenden |
| University of South Florida | Fredric Zerla, Leader |
| Florida College | Charles Goodall |
| St. Petersburg Junior College: | |
| Skyway Campus | Wilma Holloway |
| Clearwater Campus | Ernest Ross, Jr. |

The mathematics group continued with the project of the previous year - to improve the attitude of non-science students toward mathematics by the use of well written non-technical books and articles on mathematics both in class and out of class.

A major part of the project this year was the reconstruction and evaluation of the attitude test which the group found was not reliable the previous year.

Because of institutional differneces in both courses and requirements in mathematics as well as in types of teaching assignments of the participants, it was difficult to standardize and coordinate the project. In addition, preparation and abilities of the students involved varied considerably from one institution to another.

In order to evaluate the Attitude Test itself, the committee was able to apply the Kolmogarov-Smirnov, two-sample test to randomly chosen results from St. Petersburg Junior College (both the Clearwater and Skyway Campuses), Florida College and The University of South Florida. Of the original twenty-four questions, it was found that twenty were measuring in the direction of the test to within a 5% level of significance.

The Wilcoxon Signed-Ranks Test was applied to the results obtained at Manatee Junior College and at The University of South Florida. In both institutions, there was no evidence that the attitude of the students either improved or deteriorated as a result of the experiment.

The redesigned attitude test is included as appendix H.

The conclusions reached by the group were similar to those of the previous year. The statement of the group leader follows:

> No significant change occurred in student attitude in the experimental classes. The Attitude Test, however, was quite satisfactory and pertinent for future projects of this nature. There are several possible reasons for the absence of positive results in the experiment which suggest certain refinements.
>
> 1. The attitude of the student in the basic mathematics class, whether good or bad, is difficult to change by added work he considers an outside assignment.
>
> 2. The material used should be carefully chosen to correspond to the course material required by the course syllabus. This additional material should then be integrated into the course in such a manner that the student feels it is pertinent to the topic studied.

3. The time required to cover the course material itself inhibits the inclusion of additional material.

The third point indicates a need to correlate the entire course with the ideas of the project which obviously requires more careful planning. The redesigned course should emphasize not only mathematical content, but also concrete relationship to the cultural life of our society. The newly developed attitude test will serve as a reliable instrument in the evaluation of further studies of this nature.

## PHYSICAL SCIENCE

### Physical Science Group

| | |
|---|---|
| Polk Junior College | Marshall Ledbetter |
| Manatee Junior College | James Johnson |
| University of South Florida | Jack H. Robinson, Leader |
| St. Petersburg Junior College: | |
| Skyway Campus | Frank Pierce |
| Clearwater Campus | Wm. Keller |

Many of the junior, as well as senior, colleges do not have adequate facilities and equipment for individual laboratory work in physical science. The alternative has often been lecture demonstrations where students can, at least, see typical equipment and experimental operations.

The Physical Science group undertook an experiment which goes well beyond the so-called lecture demonstration and has a different purpose. It is titled the Lecture Experiment and is essentially a group experiment in which, under teacher guidance, students manipulate equipment, make observations, and collect data to be used by all students in analysis and interpretation. Each student draws his own conclusions. These are then compared and reasons for differences discussed. Students, in discussion, also often help in planning the experiment.

It was agreed by the group that subject matter goals can be achieved in part through good lecture demonstrations. The fundamental purpose of the lecture experiments, however, is to develop students' understanding of experiments, i.e., understanding of how scientists conduct and interpret experiments, and how experiments contribute to the development of science.

The group developed a set of Guiding Principles as well as a Suggested Policy for Selecting and Planning Lecture Experiments. Finally it developed a Test on Understanding Experiments.

Each member of the group undertook to develop one lecture experiment for use in the project. These were as follows:

Does a Magnet Really Attract a Charged Rubber Rod?

The Transfer of Heat to Water

The Simple Pendulum

The Inverse Square Law
(variation in intensity of beta radiation)

Burning a Candle in a Bell Jar over Water

Unfortunately, it has not been possible to include all the significant documents associated with this project in the summary report. The statements on Objectives and Policy are included as appendix I. Copies of the lecture experiments used as well as the Test on Understanding Experiments, which is particularly unique, may be obtained by writing directly to the group leader, Dr. Jack H. Robinson.

## Summary of Results

A careful item analysis of the Test on Understanding Experiments was made on a random sample of 111 answer sheets using high and low (27 of each) groups. The chi-square test of statistical significance was used with each item. The over-all result was that 15 out of 20 items did successfully discriminate.

Because it was not possible to complete the test in time to administer it as a true pre-test there are, as yet, no significant results to report on this phase. In one case the test was administered before and after two of the later lecture experiments were used. The conclusion indicated no change in understanding.

Another attempt at evaluation was to discover whether or not students differing in achievement according to final grades similarly differed in their development of understanding experiments. In two institutions there was a small but positive significant difference; in two others there was none.

In one institution, which does include individual laboratory work in the course, the test was administered to two groups, one about to complete the year course and one about half way through.

Median scores were identical! These results suggest that the amount of time devoted to individual laboratory work might be greatly reduced without any loss of understanding of experiments, or that individual laboratory work might be replaced by lecture experiments. Since individual laboratory work is not a very efficient way to accomplish general course objectives, this discovery could have considerable significance even though it is incidental to the original objectives of the project. Obviously, further exploration of this is needed.

The participant teachers involved gained a strong subjective impression that the Lecture Experiment involves an extremely interesting and potentially valuable teaching technique. Some observations follow:

> The students really were interested; they began to work up the data as it was being obtained.
>
> There were more student comments than usual at the end of a lecture-experiment period.

> Students who had previously been dead came to life.
>
> The lecture experiment provided an interesting break in the routine, and I felt "rewarded" by the students' reactions. All in all, this technique exceeded my expectations.
>
> Because of the discussion, lecture experiments took more time than demonstrations, but I felt that better learning occurred.

It is planned to continue with this project cooperatively with a further attempt to demonstrate its effectiveness objectively.

## SOCIAL SCIENCE

### Social Science Group

| | |
|---|---|
| Polk Junior College | Jane Adams |
| Manatee Junior College | Harold Jenkins |
| University of South Florida | James Swanson, Leader |
| St. Petersburg Junior College: | |
| Skyway Campus | Essie P. Roberts |
| St. Petersburg Campus | Daniel Hamilton |

The Social Science group continued their basic approach of the previous year but with added refinements and greater flexibility. Herewith is the report of the group leader, Mr. James Swanson.

> The Social Science group began preparations for their second year projects my making two assumptions. First, it was assumed that increased student involvement results in an improved learning situation; second, it was assumed that an improvement in student attitudes toward the subject studied facilitates greater understanding. Proceeding from these assumptions, the group established two basic objectives: To discover if the teaching techniques introduced in the first year project of our group (student directed activities) actually increases involvement in a meaningful way; To discover if there is any relationship between involvement and attitude.
>
> Because the Social Science Group was composed of members from various disciplines (Political Science, History, Sociology and one member from Philosophy), all teaching different courses of varied size, the methods employed were not uniform for the entire group. Generally, the methods were designed to increase student freedom and independence through a "permissive" classroom atmosphere, while at the same time increasing student responsibility for the planning and direction of classroom activities.

In several experiments an attempt was made to regulate the degree of student directed activities either within a given class or in several classes in hopes of determining if there was any point where an apparently successful technique used moderately becomes an obstacle to learning when used extensively. This phenomenon had been observed in the first year project. If students responded favorably to a technique used moderately in one class, but unfavorably when used extensively in another class (or at different times within a single class), we hoped to define the limits of the technique's effectiveness. The results indicated that success was not dependent upon the degree of utilization of a particular approach, as had been observed, but upon the acquisition of certain basic tools or procedures necessary for the successful functioning of the technique. Once the student learned "how" to do some specific operation, he was more apt to regard any technique which allowed more room for creative initiative in a favorable light regardless of how extensively used it had been. Significantly, the Social Science Group found that the acquisition of these basic skills or tools in research, group dynamics, etc. need not be extensive or elaborate. Usually an hour devoted to how one should proceed to examine some topic in the library was sufficient.

The group also discovered that certain methods are definitely preferred by students. Generally these methods were those which produced a more informal, more relaxed atmosphere in the classroom. Last year we discovered that such an atmosphere alone did not produce better grades on examinations. This year we concluded that a mere informal atmosphere with poorly defined objectives for independent study or student directed activity was not conducive to an improvement in attitude and in fact resulted in a negativism toward the technique used. Above all the students had to feel they were learning something.

Finally, it was found that students developed a better attitude towards the class and the subject if they understood the broad picture--what history, sociology, or political science is all about. This was a particular problem in history where students usually come to college with what might be called a "date-battle-king syndrome." Attempts were made in our experiments to expose the student to the discipline as a whole, with favorable results.

The findings of our experiments may not be especially profound. They conform to generally accepted good teaching practices. The value of our projects, therefore, lies not in any special contribution to educational research we may have made, but in our own teaching experience. By developing experiments on various techniques that seem to work in our classes and thus could work in the classes of our department colleagues, we feel we have taken a decisive step in the improvement of college teaching. For in the end, the improvement of college teaching begins with what the instructor does in his own classroom.

Almon A. Williams' experiment was directed primarily toward attitudinal changes of students in social science courses. One class was used (six students). For the first and last thirds of the course a simple, informal progressive lecture method was used by the teacher. During the middle third an eclectic method was used involving discussion, library days, and development of the historical framework by periods. Procedures were very informal, elastic, variable, and student-centered.

Because of the small size of the group, evaluation of attitude changes may not have great significance. The students were asked to respond in terms of like, dislike, strongly like, strongly dislike, the several aspects of the course. They responded as follows to some pertinent items:

> They tended to like the lecture method.
>
> They somewhat more than liked the other method.
>
> They almost liked the special day in the library.
>
> They hardly thought that the library day aided their study.
>
> They thought that the other method aided their understanding.
>
> They partially thought that the other method might have improved their grades.
>
> Their answers indicate a favorable attitude toward the experimental method itself, but their attitude toward its effects were barely positive except in the area of the improvement of understanding.

Essie M. Roberts used an approach involving a modified discussion-seminar, which was student centered. The course dealt largely with societal problems and group and community problems most closely related to the students' lives.

A circular arrangement of chairs was used so that students could easily converse with one another. The students received at the outset a format for analyzing social problems and were familiarized with research methods. Resource persons from the community were invited by the students from time to time to join the seminar. The instructor refrained from any formal lectures, but did occasionally raise questions and problems. Each student presented a project.

No statistical evaluations were made. Conclusions are based on teacher and student impressions. Following are some statements from Mrs. Roberts' results:

> Students seemed very relaxed and uninhibited when raising questions and discussing problems. Attitudes appeared favorable toward the subject matter. The students, most of them, seemed stimulated to seek information without having to be continuously told to do so. Initiative was used in visiting social agencies and inviting resource persons to come to the class. There was not a single person who failed to particicipate in class discussion during the session. There were about three students who were not aggressive, but they participated.
>
> It appeared that through providing some structure to the course the students did not have problems of frustration and anxiety. At the same time, the format which gave structure was not too rigid to allow flexibility.
>
> Oral evaluations made by students can be summarized as follows:
>
> Provided for critical thinking.
>
> Helped in gaining enough self-confidence to talk and ask questions in other classes.
>
> More student participation than in other classes.
>
> Desirous of more classes like this one.
>
> Very relaxed atmosphere.
>
> It can be concluded that student involvement does have merit for the improvement of college teaching.

J. D. Hamilton Courses in Logic at St. Petersburg Junior College are offered in the Social Science Division. Hence, while Mr. Hamilton was technically a part of the Humanities group in the Project, his experimentation is described under Social Science.

Four sections of Logic were involved in the experiment, two as control sections, taught by conventional procedures and two as experimental sections. The latter involved increased student activity and participation as well as decreased emphasis on instructional aid to students. Students were encouraged to construct their own proof problems and attempt to solve them.

There were no appreciable differences in grades between any of the four sections. A follow-up project using the Large-Thorndike battery of tests with four similar sections to determine possible correlations in ability to do abstract reasoning also produced no additional significant information.

Mr. Hamilton's conclusions follow:

> One conclusion seems to be that lack of success in the two experiments could be due to too many uncontrolled factors, However, the experiments did indicate that there seems to be no one best method of presentation of this difficult material, that experimentation can be conducted without a lessening of the amount of material learned. It is hoped that future experiments will enable us to find a way to increase the amount of material assimilated, as well as benefit greater numbers of students.

James M. Swanson Because of its seeming significance concerning the values, limitations, and possibilities in course structuring - or non-structuring - Mr. Swanson's interesting report is given here in full.

> Introduction
>
> The University of South Florida Social Science Project was conducted in the freshman level civilization course (HI 121-122) during the Fall and Spring Trimesters (1966-1967). During the Fall Trimester three sections of the course were involved in separate, but related experiments. During the Spring Trimester only one section was involved, composed mainly (75%) of students who had participated in one of the three experimental sections offered in the fall. Of the remaining 25%, 15% had been enrolled in a non-experimental section of the course and

10% had not taken the first half of the course at all. The final evaluation of the project thus revolved around a comparison of results obtained from both halves of the civilization survey (HI 121-122).

The civilization course is conducted with two mass lectures per week (during which formal lectures are presented by the Civilization faculty) and two hours of discussion carried out in separate discussion sections (usually consisting of 35-40 students).

Each of my discussion sections in the Fall Trimester was designed to facilitate student involvement, but in varying degrees. Section I emphasized total student direction. Section II was semi-structured, emphasizing an inter-play between the instructor and students. Section III was instructor oriented throughout. The following chart compares by category the variations of teaching techniques used in the several sections.

| SECTION I | SECTION II | SECTION III |
|---|---|---|
| Student led panels, debates, symposiums | Instructor-student panels | Instructor led recitation |
| Student planned topics for discussion | Student planned with Instructors guidance | Instructor planned Students vote on topics to be discussed |
| Students write their own essay examination questions and answer them | Students submit practice questions all term, vote on list of questions to be on exams. | Students vote on Instructor submitted questions. |
| Students assigned book on how to study history, held discussion of it if they wanted | Book on studying history discussed at length | Book assigned to read, not discussed in class |
| Textbooks assigned, Students free to plan discussions on any one of them or any part | No specific textbook assigned, Students read from several made available in reserve reading room | Textbooks assigned but Students could use any textbook on reserve if they wanted. |
| Attendance not required | Attendance not required | Attendance not required |

Pre-tests were administered in all three sections to determine basic attitudes toward history as a discipline, library skills, and types of teaching techniques they thought were best. These tests revealed that the vast majority of students had no conception of how history is taught at the college level, had minimal skills in library research (i.e. where to find books on a given topic, difference between primary and secondary sources, use of scholarly journals, bibliographic aids, even use of the card catalog). Most expected the instructor to carry the ball in class by either lecturing or holding recitation-question and answer type discussions.

Post-tests revealed that students in Section I had not improved their research skills, had not become involved to the point where they would seek to develop these skills on their own, had no better idea of what history as a discipline is than they had before the term began, and were generally ambivalent towards history and the history of civilization in particular. A full 30% said they would not take another course in history. These students seemed to like the freedom they had, yet disliked most of the techniques employed. Seventy per cent thought they would have learned more under a different system. Their examination questions displayed a complete lack of understanding of what constituted a valid question.

Section II apparently enjoyed the course most. They felt they were learning important things. Only 20% thought they could learn more under a different system while only 10% said they would not take another course in history. With relatively more discussion of historical methodology and practice in writing meaningful questions this group prepared the most sophisticated examination questions and voted for the most complex open ended ones to be included in the examination.

In Section III, where the students also voted on the essay question to be included in the examination (though these were prepared by the instructor), the students selected the more traditional "fact oriented" questions. This section had not developed any research skills, had made little use of the library - including textbooks on reserve. Section II, on the other hand, performed exceedingly well on the post-test section devoted to questions on the library. Many commented that having the opportunity to select different textbooks for different topics or to read several textbooks to get a broader perspective on a given topic led them to search out other books on subjects of special interest. On their own initiative, students in this section decided to compile a bibliography of books and articles available in the library on the Enlightenment. Several copies were made and placed on reserve for students in all sections to use. Interestingly, only 15% of the students in Section III thought they would learn more under a different system, a lower percentage than in Section II, and 15% said

said they would not take another history course. Attendance in Sections I and III was poorer than in Section II (by head count). Often when students in Section I planned a panel discussion one or two students on the panel were absent.

Conclusions

It is clear that what happened in Section II was the most promising. Students became involved. They were given some direction by the instructor who helped clarify objectives and suggest ways of solving certain problems. The students took over from there. In Section I the students felt lost, bewildered, and insecure. In Section III students did not make good use of the opportunities they had to work independently, to become involved.

These findings were reinforced in the follow-up section in the Spring Trimester when the techniques used in Section III were deliberately employed to determine differences in attitude. Of the 10 students who had been in Section III the term before, there was very little difference in response to questions about the conduct of the class. They had not become more involved. Roughly the same percentage of students felt they could learn more under a different system. Of 23 students who had taken Section II in the preceeding term, 20 felt that a different system would facilitate more learning. Many wrote that they preferred the system used last term. Students who had been in Section I (17) seemed relieved to be back under a more familiar system. Most important, the students who had been in Section II continued to be involved. They made use of the reserve books as before and several asked to submit extra work they had done.

Grades for the students were not analyzed, largely because of other factors which enter into the process. In general, however, students in Section II wrote better essays during the Spring Trimester. They performed as well as the other students on mastering the factual materials.

Little need be added to the significant results Mr. Swanson has obtained except to make the generalization stemming from them: Students are ready to accept much more freedom and responsibility for their own education than we are willing to give them, but they still need guidance and encouragement from their teachers.

## Student Evaluation, 1966-1967

As has been indicated, the plan of using experimental and control sections taught by the same teacher was not, in general, used in 1966-1967. In order, therefore, to get some comparative evaluation of student experience it was necessary to change the evaluation form somewhat. The revised form, Supplement C is included as appendix E.

Students were asked to compare the experimental class with others they were taking. The responses are subject to a halo effect. Almost all the averages of responses were favorable to the experimental classes. In a few cases there was no difference; there were no unfavorable responses.

A six-point response scale was used for all of the items, and the possible responses varied from "much less" through "same" to "much more." Some 700 responses were machine scored and analyzed. Average responses to some pertinent selected items for the 700 students are indicated here. Figures in parentheses indicate the average numerical response. (response of 3.0 indicates no difference)

In experimental classes: teaching methods varied more (3.3); skills acquired in analytical and creative thinking increased more (3.3) (3.3); students felt more relaxed (3.3); teachers made more use of teaching aids (3.3), they were better lectures (3.3) and better teachers (3.3). Lectures were less repetitious of the textbook (2.6); teachers were more friendly (3.4); they knew their subjects better (3.4), related them to life better (3.3), and had broader backgrounds (3.4). Students had to work a little harder (3.1); their time spent in this class was slightly more valuable (3.1). The way the course was taught was moderately different (2.7). (Possible responses were from "about the same" (1), to "very different" (6)), it went beyond the textbook more (3.3). By both definitions of good teaching (items 42 and 43), "that which takes place after the teacher ceases to pass on information," and "the (good) teacher guides student learning" they rated these teachers higher (3.3) (3.3), but they were no more authoritarian or permissive than their other teachers (3.0). Moderately (3.2) these students preferred the experimental class to others they were taking.

These, of course, are not striking differences but, in the aggregate, they indicate a favorable response to experimentation in teaching and learning. When the responses are broken down by disciplines some greater, as well as lesser, differences are noted.

In biology, students felt they were learning more (3.4), were "discovering" things more for themselves (3.4), went well beyond the textbooks (3.8). By both definitions of good teaching (items 42, 43) these teachers were above average (3.4) (3.2). They were slightly less authoritarian as teachers (2.9).

In English, teaching methods were quite varied (3.6), students improved considerably in both creative and analytical thinking (3.7) (3.6), participated more (3.5), and did more work (3.6). Teachers were slightly more authoritarian, were friendly (3.5), related subject matter to life well (3.6) and by both definitions of good teaching rated well (3.5) (3.5).

It may be possible to gain some indication of the extent of the halo effect by noting responses in the humanities group (110 students responding) where little actual experimentation was possible. There are, of course, other possible interpretations of these differences. Students felt that they participated less (2.8). The kinds of things learned and the ways of learning them were less worth-while or helpful (2.9) (2.9);they participated less (2.5) and did not become greatly involved (3.1), or feel very independent (3.2). Teaching was quite authoritarian (3.3) and teachers did not welcome disagreement (2.8). Students did not think they "discovered" much (3.1). On the more positive side the teachers were good teachers (3.3), made the class "alive" (3.5), were friendly (3.3), knew their subject well (3.5), had broad backgrounds (3.4). By both definitions of good teaching they rated slightly above average (3.2) (3.1).

Since the mathematics project was directed toward the objective of improving attitudes, most of the evaluation items provided little measure of differences. However, the failure to change attitudes is reflected in some of the responses. Students did not feel very positively that bringing in readings did much to make the class come alive (3.2); they felt the same about involvement in the subject (3.2); nor were they particularly inspired (3.1). They felt less independent (2.8), and less secure (2.9). On the other hand, they liked their teachers. They were good lecturers (3.4), good discussion leaders (3.3), very friendly (3.6) and knew their subject well (3.4). By both definitions of good teaching they were above average (3.3) (3.2).

As has been noted, the physical science group was not able to complete its project. And, somewhat like mathematics, it was directed toward objectives not easily measured by the evaluation instrument. Most of the responses were close to the norm of "3," differing by not more than 0.2 points. A few are interesting. Students felt they participate less (2.7), that teachers talked more (3.4), used more teaching aids (3.9) and knew their subject well (3.3). It was hard to get by without "cracking" the book (3.5).

In social science the number of students responding to the evaluation (16 from two small classes in two institutions) is too small to provide an appropriate sample. Because the significant part of his experiment was carried out in the fall term, Mr. Swanson could not administer the evaluation form; Mr. Jenkins was unable to do so for other reasons.

Nevertheless judged by these few cases, both of these experiments appeared to be highly successful as a few of the significant responses indicate. Time spent in class was very valuable (3.7); both creative and analytical thinking were greatly improved (3.9) (3.8). Participation was high (3.8); students felt relaxed (3.8) as well as secure (3.5). They became deeply involved (4.1) and felt independent (3.8). Their teachers rated well (3.5), made the class come alive (3.9) and inspired them (3.9). They were friendly (3.7), knew their subjects well (3.9), and were particularly successful in relating the subject to life (4.3). By both definitions of good teaching they stood high (3.8) (3.9).

Of course, individual teachers and classes also varied considerably in ratings given them by the students involved. The differences between institutions were minor and in general, not significant.

Trends in student evaluations of the 1966-1967 year project were similar to those of the preceding year but it should be remembered that they do not measure the same things. The first year of the project compared responses of students in experimental classes with those in control classes of the same course. In the second year, only students in experimental classes responded, comparing their experimental class with others they were taking. Thus, this year's evaluation should be regarded as more subjective. However the trends are the same, and the amounts of difference are of the same order. It would appear that this means of evaluating was satisfactory.

## Over-view of the Second Year

The results of the second year add nothing significantly new either by way of radically different types of experiments, or by way of outcomes. Instead, they tend to reinforce the results of the first year but with a somewhat greater implication that through more careful structuring the *average* student can, and will, respond favorably to greater freedom and responsibility for self-learning. The students also liked the experimental approach somewhat more than did those of the first year, indicating that participating teachers had gained in the know-how of experimental teaching approaches.

# CHAPTER V

## Changes in Participants as Teachers - Effects on Institutions

Three instruments were used to try to measure changes taking place in participants as teachers during the course of the project. Since these are self-evaluations they are obviously subjective, indicating the individual's own estimate of change.

### INVENTORY OF TEACHING PRACTICES, ATTITUDES AND BELIEFS

This form, prepared by the Project Office, was used with all participants at the first workshop in September, 1965, and was given again at the last workshop in May, 1967. Some pertinent averaged responses from all of those who responded both times (23 participants) are indicated below. Responses to items were on a scale of 1 to 5. The average changes (increase or decrease) are indicated in parentheses.

The use of informal lectures had increased (3.5 to 4.2)

Real discussion in classroom had increased (2.7 to 3.4)

Use of debates and panels in class had increased (1.4 to 2.3 and 1.6 to 2.1) (if the increase were given only for the social science participants, where these techniques were part of the experiment, the changes would be much greater)

More use was being made of the tutorial procedures (working with 2 to 3 students at a time (2.4 to 3.3)

Students were used more in planning and carrying out courses (1.5 to 2.5)

Various teaching aids were used more (3.0 to 3.5)

Students made more oral reports in class (2.4 to 3.2)

Student class leaders were used much more (1.9 to 3.0)

Scientific lecture demonstrations were used more in science (2.1 to 4.0) (applicable to physical science group only)

The teacher did less talking in class (3.7 to 3.4), and students talked directly to other students more frequently (2.5 to 2.8)

The classes were more relaxed according to the teachers (4.1 to 4.4) and had a greater feeling that it was "their" course as well as that of the teacher (3.4 to 4.0)

There was greater flexibility in teaching techniques (4.3 to 4.6) and in accepting the ideas of students (4.0 to 4.5)

Teachers tried much more to bring out shy students (3.0 to 4.0) and to encourage weak students (3.6 to 4.1)

These teachers felt that their students now had slightly less chance to get by without "cracking the book" (2.6 to 2.3)
Class materials were more challenging (3.7 to 4.1)

There were also interesting changes in teaching beliefs or opinions. The participants felt more strongly that a noisy class is not necessarily poorly disciplined (3.0 to 3.8). They felt less strongly that the principal job of the college teacher is to put across well organized information (4.0 to 3.5), and more strongly that the principal job is to guide and stimulate students (4.4 to 4.7). They favored permissive teaching somewhat more strongly (2.6 to 3.1), had not materially changed their opinion about authoritarian teaching, with which procedure they mildly disagreed (1.9 to 2.0), but believed very decidedly that the two procedures could be combined by a teacher to accomplish both aims (4.0 to 4.9).

Although they did not strongly agree even in the beginning with the old saying that "we teach as we were taught," they agreed with it less at the end (2.4 to 2.0), and they also agreed less with the statement that "If one knows his subject well, he can teach it well without any training in 'how to teach'" (2.2 to 1.9). They were somewhat less certain that "much of the poorest teaching is done at the college level" (2.8 to 2.5), and more certain that "most college teachers lecture because they do not know of any other ways of teaching" (2.0 to 2.7). They agreed more positively with Carl Rogers statement that, "you cannot teach, you can only learn" (3.0 to 3.6). They felt that listening to students was slightly more important than they had felt in the beginning (4.2 to 4.4).

It is clearly evident that all of these changes in the teaching attitudes, behavior and beliefs of the participant group as a whole are in the direction of involving students and placing more responsibility on them for their own education.

These are not spectacular changes but they do include some whose individual changes were little short of spectacular, along with some in which the indicated change was slight.

It is rather curious that although the members of the participant group believe they have changed substantially concerning greater participation by students in their own education, they do not appear to believe that they are now more permissive teachers (3.2 to 3.2). (In the supplemental form described next they do believe they are slightly more permissive.) The answer to this apparent contradiction is probably to be found in their belief, previously noted, that one can combine authoritarian and permissive teaching to gain the values of each.

## SUPPLEMENT I
## to
## INVENTORY OF TEACHING PRACTICES, ATTITUDES, AND BELIEFS

This self-evaluation form used only at the final workshop attempted to get at both behavioral teaching changes as well as the effect of the project in bringing about these changes. Participants were asked to respond to the items in two ways, (1) to indicate total change on a scale of 1 to 6 and (2) to indicate the percentages of the change which they could honestly attribute to participation in the project. Obviously, both of these are subjective responses, and the percentage responses are particularly so, since there is no way of knowing what changes would have taken place without the project. Those who liked it best and gained the most would naturally indicate a higher percentage of change as due to the project than those who already felt that they were good teachers and did not need to change much.

The form, giving average group responses, is included as Appendix B. It will suffice here to indicate some trends. Percentages of change attributed to participation in the project ranged from a low of 41% on one item to a high of 80% on another. The amount of lecturing done was moderately less. Permissive teaching was slightly more frequent, as previously noted. Discussion in class was moderately more; student participation was decidedly more. Consciousness of the need to keep trying to improve one's teaching was moderately greater as were variations in teaching methods. The participants felt that as teachers they were now moderately more effective and their rapport with students was slightly to moderately better. They were moderately more aware of what constitutes good teaching and were doing "teaching" (that which takes place after the teacher ceases to pass on information) decidedly more. They were placing moderately more responsibility on their students and were getting them involved in the subject to a similar extent.

It is evident that these changes reinforce those already noted. Participants attributed 55% of all such changes to participation in the project which is flattering but probably on the high side. It does, however, give clear indication that the participants, generally, felt that they liked and profited from the project.

## SUPPLEMENT II
## to
## INVENTORY OF TEACHING PRACTICES, ATTITUDES, AND BELIEFS

The third evaluation instrument provided opportunity for open-end responses and was used only at the end of the project. Some pertinent statements from these responses are included here.

> It has given me a chance to evaluate my teaching techniques with the student as the focal point.
>
> My convictions on the worth of experimentation have been strengthened. I am less apologetic in expressing my ideas. I have opportunities to experiment with official blessing.... I am more aware of shortcomings in my own teaching.
>
> I came (to the workshops) expecting much and I always got more than I expected.
>
> ....The organization and structure (of the project) resulted in several difficulties. The hope of reduced loads never materialized....Project consultants should have evaluated group projects before they were initiated. I generally disagree with the policy of selecting 'new' teachers. At the time of my selection I had been teaching for 2-3 weeks. Participation has been a stimulating and valuable experience.
>
> There should be more organization on each college campus so that there could be more interaction among the members of each college group.
>
> I have found the project to be one of the most valuable and interesting experiences I have encountered....Most important, however, it gave me a chance to try something I previously had in the back of my head including the initiative to do something new for a change.
>
> Many college teachers need this exposure to stir up their imagination and broaden their over-all appreciation of good college teaching.
>
> I have changed in that I now consider that developing a student's ability to work on his own is just as important as

important as providing him with subject matter information....I have become more aware of student problems.

Increasing awareness of my teaching - both techniques and general philosophy....

More guidelines would have let the projects jell quicker and would have given more time to work with statistics and make changes accordingly. I believe that if I had not participated in the project I would have fallen into one set method of teaching and would probably have continued unchanged....The greatest weakness has been in the ability to evaluate results.

The project has made me more aware of the goals and methods of good teaching.

After the first evaluation of teaching procedures...I wasaware of some of my weaknesses and during this year they were recalled like a 'sore thumb.'

For me the project has had no obvious results and the realization that agreement is virtually impossible.

The big problem was lack of time....Perhaps more of the work could be scheduled for summertime or periods between school terms.

The general feeling is that the humanities people can never have a "meeting of the mind" and participation of this group in the project would appear to bear this out. However, I have benefited from the exchange of ideas....

Back in graduate school at --, we were amazed that the worst teachers received advancement while the best teachers were thought to be useless....I had naturally assumed that deans were only interested in research, and teaching was ignored....A very popular book in my graduate days was, Some of My Best Friends are Professors. A group of us vowed to do something about this deplorable situation....This project has encouraged me to resume those early ideas....

I have been given the opportunity for professional growth. I am more keenly aware of the necessity for content modification.

## Rating of Aspects of the Project

Each participant was also asked at the final workshop to rate the several aspects of the project in order of their value to him. As might be expected, their own experiments ranked clearly in first place. In second place came getting to know people in their own fields, and the discipline group sessions at the workshops. Closely behind came the separate discipline group sessions held at various times during the year as planning and evaluation sessions. It is obvious from these responses that the plan of operation through small discipline groups, each member coming from a different institution, was both stimulating and highly successful.

The general sessions of the workshops, learning about other fields, seeing other teachers in action, and the services of outside consultants all received lower ratings.

## Apparent Procedural Weaknesses

It would seem that one aspect of the original plan which stood high in the minds of the planners was not very successful. It was hoped that there would be considerable intervisitation of classes and that both the visitor and the visited would profit. This took place only to a limited degree - largely, according to the participants, because they were too busy to leave their campuses for a day or even a half-day, of such visiting. Undoubtedly this aspect should have been more highly structured. It was left to participants to communicate with one another in planning such visits and this did not happen very often, due no doubt to the press of teaching duties at home.

This leads to still another factor which undoubtedly limited the success of the project. Because of the production formula used in the Florida Community Junior College system it was not possible in all cases to provide released class time for those involved in the project. This meant carrying on the project as an overload. Even though efforts were made to lighten loads in other ways by release from committee and other assignments, this did not usually equal a reduced teaching load. There is no question in the minds of the Executive Committee and the Director that this necessity had an adverse effect upon the success of the project, especially in its earlier stages.

It also seems evident that better use could have been made of outside consultants even though they were very popular with the participants and all did excellent, stimulating jobs.

In reviewing procedures used, the Director now feels that a longer period for the initial workshop should have been planned, that several outside consultants should have worked with the groups at that time, that released teaching time for the participants should have been assured in advance, and that arrangements for inter-visitation of participants should have been more highly structured.

## Executive Committee Evaluation

As a final step in the evaluation of the project,each member of the Executive Committee conferred with the participants from his institution to obtain their informal reactions to various aspects of the project including its effects upon the several departments and the institutions as a whole. Each participant was also asked to respond to similar items. These participant responses range from little to very considerable impact, and vary with the size and nature of the institution as well as the carry-over enthusiasm of the participants. It is felt that reports from members of the Executive Committee may be more pertinent in judging this phase. Several pertinent statements follow.

> All of the participants at our college have indicated that when they commenced the Project they tended to feel that one who is competent in his teaching field probably would teach effectively. This myth has been destroyed through participation in the Project, and they have now come to realize the greater relevance of other factors than one's own special competence in the field of instruction.
>
> Of particular interest is the increased awareness on the part of the participants of the need to let students discover some things for themselves. Both teachers and students are now engaged in a common project. This feeling of comradeship tends to tear down the traditional barrier that prevents effective communication between teacher and student.
>
> Students in the experimental classes tended to complain about the difference in the type of work they did and that done in the control classes. In some instances, students felt they were penalized by a heavier work load. Generally, the response to the experimental methods was positive.
>
> I have come to believe that the workshops were as valuable as were the experiments. Our teachers believe that there was far more value in the meeting in their individual groups than there was in the general meetings when reports were made from the respective teaching areas to the entire group.
>
> These teachers who participated in the Project have brought to the campus a concern for teaching which has provoked some interest in literature in the field and has caused some discussion of teaching methods and procedures. In addition, there has been established a dialogue between some of the faculty dealing with how to teach.
>
> The impact of the Project on this College has not been as significant as was hoped. There have not been any sensational results. ...however, there are positive results which may become more significant with the passing of time.

- - - - - -

I feel that the teaching project was successful at our college. Of our six original participants only two seemed to be unaffected.

The first year we experienced some resentment on the part of the rest of the faculty because of released time and intervisitation privileges. This however was not a problem the second year. We also experienced some student resentment in the experimental classes at first.

The greatest improvement I have noticed has been in the attitude of teachers toward students. They are more aware of students and student needs and are more involved with students than they were previously.

Some of our teachers who were not in the project, especially in the science department, are planning an improvement program within the department involving team teaching.

I feel that the inter-visitation program was perhaps one of the best "eye-openers" included in the project. I think it should have been emphasized and continued more the second year. Some of our project participants have criticized the project because skills were not emphasized as much as theory.

We plan an intensive in-service training program here this fall and I feel this is a result of our participating for the past two years in the teaching project.

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The project helped this teacher to change from the traditional lecture demonstration method of teaching to the use of more student participation and more audio-visual materials.

The project helped successfully to convert this teacher from a specialist to a teacher of students.

Evidence of improvement as a result of participation in the project was not shown by this teacher.

This teacher was a good teacher when the project began and as a result of it is now an outstanding teacher.

The project helped this teacher make a most significant change in teaching behavior. We observed a change from emphasis on mastery of subject matter without regard for the student's learning style to an emphasis on mastery at the student's pace. It was most gratifying to have the project accomplish this.

This teacher has more student participation in class. Before the project, students answered questions when asked and that was the extent of their participation. Since the project, there have been group discussions and student reports.

The lecture was the predominant teaching method used by our teachers but since the advent of the College Teaching Project we have had to take out of storage all of our audio-visual equipment. In fact, we have had to order more equipment.

One of the major gains as a result of the project has been the change in emphasis from subject matter to emphasis upon student learning. This is evident in the report of the counselors.

A change in the general tone of faculty meetings and informal teacher discussions was another obvious result of the project. Most meetings were dominated by the discussions of the project participants of current writings from their professional journals. This stimulated reading of professional journals by other members of the faculty. By the second year, the project participants no longer dominated meetings. The faculty in general attempted to keep up with current trends in education.

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Some positive aspects include an increased willingness to experiment with teaching methods and make changes; a greater realization of the effect of various methods.

Some negative aspects include the following:

No beginning teacher should be asked to participate, according to some participants.

Most people felt that the project was too demanding of time and energy.

Released time or load reduction should be made a part of the project.

Some individuals felt the project was too long.

In conclusion - no one denied that the project had value. The common opinion shared by the majority was that the overall impact of the project was most favorable. They especially enjoyed meeting all their counterparts in other institutions, and sharing experiences and visitations with them.

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The permeating effect of the Project is apparent to those of us close to the situation, even though the effects are somewhat subtle and difficult to document quantitatively. I am told, however, that in nearly every department where our participants are teaching, colleagues have become interested and in several cases are initiating similar experiments of their own. A certain prestige seems to have been acquired by our representatives, and such educational experimentation has gained status.

In one or two instances, the department has turned to the participant to give leadership in working out new programs.

In the sciences, new laboratory projects are being worked out that include some of the ideas developed through this teaching program, and they will be pursued by all the teachers working in the course.

It should be added that we are now working on a proposal to promote intervisitation of classes and to employ a consultant to work with any faculty member who wishes to experiment on new instructional procedures. All this is a direct outgrowth of the program and probably would not have happened were it not for the feedback to the faculty that this program has engendered.

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# CHAPTER VI

## CONCLUSIONS, INTERPRETATIONS AND IMPLICATIONS

Many of the more specific conclusions reached in the Project appear in Chapters III, IV and V. It remains here to draw them together into more comprehensive generalizations and indicate valid interpretations and implications.

As has been noted throughout the study, students in experimental sections did not learn more than comparable students in control or other sections, at least as judged by teacher-prepared subject matter examinations. Nor, did they learn less (which supports the well worn statement that students will learn whether or not we teach them). It can safely be concluded, therefore, that none of the procedures or techniques used increased the amount of subject matter learned. Had the Project been specifically designed to do this it ought to be considered a failure. This was not its purpose.

It was a cooperative grassroots attempt to demonstrate that giving students more responsibility for their own education was tenable and feasible. The fact that they learned as much as other students and did it under circumstances involving greater freedom and responsibility is the significant aspect of the Project. In addition, there is clear evidence that many learned things beyond the subject matter which they regarded as important.

What are some of these things beyond subject matter which many of these students seemed to acquire? Perhaps they are minor; or perhaps, taken together, they are major as a complement to subject matter knowledge. We do not know. They include such seemingly small things as students learning to talk directly to one another in class and in workshop groups, learning to work together in small groups, learning to give and accept criticism with peers, learning to work alone and organize a work schedule, learning how to find, develop, and use resources, learning to speak before groups, participating in class and group planning, learning to go beyond and behind the textbook, learning how to get deeply involved in a subject, and learning to understand that education is not merely listening to planned lectures.

Should these and other small things acquired be part of a college education? They are a part of life, a most important part. They are also an important part of extracurricular college activity. Yet we manage pretty well to exclude them from the classroom. Why? Should it be our purpose to deny them these intangibles in the classroom, or should we take the deliberate responsibility to provide them, since it appears that subject matter learning will not be adversely affected? The question seems to come down to this: can we have academic standards and student freedom to learn at the same time? The answer coming from this Project is, "yes."

It is also, however, reasonably clear that superior students in the main can adjust to freedom more easily than can the less able students. This is to be expected. There is a clear cautionary note in the results of the Project which says in effect, "not too much freedom or there may be nothing but frustration and chaos." Mr. Swanson's experiment points this out in no uncertain terms as do some of the others. This is not at all surprising since the same thing happens in life. The question is whether or not some intermediate degrees of structuring and freedom can be found in which both superior and less able students can find comfort, gain the extras, and make progress. Here, again, the implications of the Project are that this is both possible and achievable. This question, as well as the means, to provide optimum structuring need further concentrated attention.

Many of the limitations of the project have been mentioned. More time and consultation could have been used in the initial workshop. Participation by many of the teachers constituted an overload; student exposure to experimental procedures was minimal; courses varied greatly from one institution to another providing little common ground within some disciplines; intervisitation of classes was not as effective as had been hoped; a few participants did not get much lift from the experience, while a few more seemed only to go through the motions. One, an experienced teacher, dropped out early feeling he had little to gain.

As an estimate, based on the judgments of the Committee members, some three-fourths or more of the participants did profit, many of them greatly, from the experience. To repeat what several said, "We will never be the same again."

Even a failure from which we can learn is worth more than a success from which we do not learn. The mathematics group failed to change attitudes favorably by introducing non-technical readings. This failure is significant. It seems to point out that favorable attitudes have little to do with humanizing the subject for the great majority of students. We had better look to other, deeper approaches to this problem. There is also, no doubt, a perverse Hawthorn effect operating here. General students are not supposed to like mathematics;

therefore they do not like it. They prefer to endure it, or more aptly, to sweat it out, painfully but boastfully.

In spite of shortcomings, however, there can be no doubt about the over-all success of the Project in meeting its major objectives. Certainly both the participating teachers and the students involved have clearly testified to this.

On the other hand, we have not attained each of the objectives equally well. We have discovered and confirmed through experience an effective program for improving college teaching, (objective 1), but certainly not one that can be handed over to others with any "how to succeed" formula. There is no way, we have learned, to improve one's teaching except to try, try again, and try harder. And what works for one may not work for another. But we have provided samples which others, hopefully, will want to try and can improve on.

We have, we are certain, provided fresh and creative ways for making students more responsible for their own learning, with findings that can be reported to the profession (objective 2). We have clearly demonstrated that students can, and will, accept much more responsibility for their own learning if we will only give it to them. The problem is not with the students but with the teachers, too many of whom are unwilling to give up their positions of authority and control. We have found clear evidence that some teachers can adjust to this kind of change, which places them in the position of guide rather than master.

Because of the nature of the project, evaluation of both teacher and student growth during the course of the project (objective 3) has not been an easy task. Teacher growth as evidenced and reported in Chapter V has been substantial. A great deal of this, as is there indicated, has come from participation in the Project, particularly from the stimulus of group interaction, as well as from administrative encouragement and backing. Participants and groups felt free to pursue their own interests; they could do so without losing status; in fact, they gained status and the respect of non-participating colleagues. Workshops were definitely planned to provide time in a relaxed environment away from the typical campus atmosphere of hurry, hurry.

It is quite likely, on the other hand, that student growth has not been sustained. After all, only about one-fifth of a student's time for one term out of eight in a normal college career was involved with the Project. It is reasonably certain that very little of the infection rubbed off permanently and that most students have happily returned to easier ways of getting through college. But, many at the time indicated they had gained something extra.

The question of whether new, or more experienced, teachers should participate in such a venture is still unresolved. But it is clear from some comments that a brand new teacher may be placed in double jeopardy trying to orient himself to two rather unlike situations at once. A year or two of teaching experience before undertaking this kind of adventure seems preferable. Beyond that, there appeared to be no real differences between those with considerable teaching experience and those with little. Group thinking and action undoubtedly played a significant role here. Many of the more experienced teachers were highly innovative as were their less experienced colleagues. A few in both categories merely followed along.

The effect of the Project on the institutions involved has been variable and, in general, inversely proportional to size, as might be expected. In one smaller institution the impact was of major nature; in another it was marked. In the others it was moderate. There are many indications, however, that the infection is continuing to spread in all of them, and that experimentation in better ways of teaching is becoming respectable. As is indicated later, the machinery for continuing the infection is already in motion. Impact beyond the institutions involved is, naturally, modest. Nevertheless, educators throughout the State are well aware of,and interested in, the undertaking as are various national educational bodies.

Although not mentioned originally as an objective, the cooperative nature of the enterprise was certainly a significant aspect - to determine whether teachers from different institutions, different disciplines, and even different courses within disciplines, could work together on common projects in the improvement of college teaching.

This was by far the most successful aspect of the project, as many participants have indicated in various ways at various times. Getting to know each other, visiting each other's campuses and classes, attending discipline group meetings at workshops and at other times, and exchanging ideas - all stood high in expressed values attained. The discipline group sessions did not degenerate into mere subject matter shop-talk as so often happens in such situations. The major objectives came through at all times.

Even before the end of the first year, participants were talking about wanting to continue this kind of association after the official termination date of the Project. It is, therefore, both gratifying and significant that this is just what is taking place spontaneously.

At the final workshop the present Committee "bowed out," a new Executive Committee was selected by and from the participants, one from each campus, and a part-time executive officer was selected who had served first as a participant and later on the original Executive Committee. The continuing project is being financed by modest contributions from each of the institutions involved.

The new Executive Committee consists of the following:

| | |
|---|---|
| Charles Goodall | Florida College |
| Harold Jenkins | Manatee Junior College |
| Jack H. Robinson | University of South Florida |
| Ernest R. Ross, Jr. | St. Petersburg Junior College<br>Clearwater Campus |
| Geraldine Turner | St. Petersburg Junior College<br>St. Petersburg Campus |
| Paul White | Polk Junior College |

Mr. Joseph C. Gould, Department Chairman, Natural Sciences and Mathematics, Clearwater Campus, St. Petersburg Junior College, was selected as the Executive Officer.

While the plans of this committee are not yet complete, the new group is moving ahead without pause or delay. A first meeting of the Committee has already been held. It is expected that new participants will be added, projects will be sponsored, and ideas exchanged between institutions. The name adopted by the new organization is The Tampa Bay Council for Improving College Teaching.

This is probably the first non-grant-financed inter-institutional organization of its kind anywhere. Significantly, it is directed and operated by classroom teachers, not administrators, but with the strong and enthusiastic backing of administrations. It lends powerful support to the cause of major concern in higher education - the need to examine and improve the function of teaching. It continues to guarantee respectability for those who see the need and want to do something about it.

This wish to continue, the enthusiasm for continuing, and the well defined plans for doing so constitute the most significant outcome of the Project.

# APPENDIX A

FLORIDA COLLEGE TEACHING PROJECT
Office: University of South Florida

August, 1965

## INVENTORY OF TEACHING PRACTICES, ATTITUDES, AND BELIEFS

(This form was used in September, 1965 at the first workshop and again in May, 1967 at the final workshop. The average of responses and changes to some selected items by participants who responded both times are included in Chapter V.)

One of the principal purposes of this project is to gain some evaluative measure of improvement in college teaching and learning techniques. We are concerned here with ability to teach the subject better rather than with knowledge of the subject matter itself. While each discipline may have some techniques unique to its own materials, all good teaching has many techniques in common.

In order to determine the kinds and extent of changes taking place in teaching procedures during the course of the project it is necessary to have some kind of starting point. In part A of this inventory you are asked to indicate your present teaching practices by checking the following list of statements. Be completely honest. Answer in terms of what you actually do, not in terms of what you think you ought to do. Otherwise it will be impossible to measure change. Also we expect to give a somewhat similar list of items to your students during this term to see how closely their judgment of you matches your self-judgment. None of these results go to your institutions. But you may want to know the results of your own students' evaluation of you.

## PART A. PRESENT TEACHING PRACTICES

These items have to do with your present teaching procedures and should be marked from zero to 5; 5 if you use the procedure regularly and frequently to 1 if you use it rarely and zero if not at all.

A 1 Use of formal lectures
A 2 Informal lectures (students may interrupt with questions)
A 3 Classroom discussion (real discussion, not just another informal lecture or recitation)
A 4 Oral quizzing of students to see if they know the lesson (recitation)
A 5 Use of verbal or blackboard drill in class
A 6 Use of term papers
A 7 Pop written quizzes given

A 8 Individual projects used
A 9 Group projects used
A10 Debates in class
A11 Panels in class
A12 Forums in class
A13 Visiting lectures
A14 Dramatization or role playing
A15 Use of cases as basis of discussion
A16 Teaching students to take notes effectively
A17 Teaching students to listen effectively
A18 Use of field trips
A19 Use of tutorial method (working with 2 to 3 students at a time)
A20 Hourly written examinations given
A21 Student committees used to help plan and carry out courses
A22 Audio-visual aids used (movies, slides, television, etc.)
A23 Teaching aids used; overhead projector, models, graphs, pictures, etc.
A24 Use made of programmed learning
A25 Use made of independent study (good students placed on their own and not required to attend class)
A26 Giving students at the beginning a well prepared plan, including the objectives, of the course
A27 Making clear and precise daily or topical assignments
A28 Requiring students to make verbal reports to the class
A29 Using class time for personal anecdotes and stories
A30 Letting students lead the class at times while the teacher "sits back"
A31 Individual laboratory work a part of the course (if not applicable mark zero)
A32 Scientific demonstrations performed in the classroom (if not applicable mark zero)

## PART B. TEACHING ATTITUDES AND HABITS

These items have to do with your teaching attitudes and habits. Please rate them in the same way, 5 if a statement applies strongly to your teaching, to 1 if it applies little, and zero if not applicable.

B 1 How much of the talking do you think _you_ do in class discussion
B 2 Do students talk directly to other students during discussion
B 3 Is the seating arrangement such that students can easily talk to, and face, other students
B 4 Motivating good students to go beyond the assignment by specific suggestions
B 5 Making the course "alive" by bringing in fresh material and relating it to the lives and experiences of the students
B 6 Encouraging students with special, related experiences or interests to report to the class
B 7 Requiring the use of correct grammar in both verbal and written reports

B 8 Willingness to have students disagree with you in class without the feeling they will be penalized

B 9 Willingness to say "I don't know the answer" and possibly adding, "I will look it up and let you know"

B10 Willingness to say "I am not sure but I think it's this way"

B11 Joking with the class

B12 Is the class "relaxed" (5) or "tense" (1)

B13 Does the class feel that it is "their" course, as well as the teacher's course

B14 Praising students in class for a job well done

B15 Using first names of students

B16 Are you flexible in your teaching techniques depending on the assignment at hand

B17 Are you flexible in accepting and dealing with ideas presented by students

B18 Do you like students as individual human beings

B19 Are you available, and willing, to consult with students at odd times

B20 Do you have individual conferences with all students outside of classroom time

B21 Do you think the administration is helpful in trying to provide the environment for a good teaching job

B22 Do you feel "anti-administration"

B23 Is your voice loud enough and your enunciation clear

B24 Do you vary your voice quality when lecturing to avoid monotony

B25 Do you use sarcasm with the class when students are not well prepared

B26 Do you use sarcasm with individual students in class when they give a wrong or silly answer

B27 Do you "pace" a lesson so you will cover it in a period

B28 Do you show favoritism toward certain bright students

B29 Do you show favoritism toward apple polishers looking for grades

B30 Do you show favoritism toward the opposite sex

B31 Do you try to bring out shy students

B32 Do you encourage poor students who find the subject difficult

B33 Are you moody - do you take out your personal feelings and problems on the class

B34 Do you have a sense of humor in class

B35 Do your students gather around your desk at the end of the period to talk or ask more questions

B36 Can students get satisfactory grades in your course(s) merely by taking careful notes in class and reviewing them without "cracking" the textbook

B37 Do you get your students excited about some topic so that they explore it further on their own initiative

B38 Are materials of the course made challenging and alive by supplementing text materials and adding provocative ideas

B39 Are lectures carefully thought out, organized, and outlined, and not mere re-hashes of the textbook

B40 Are corrected examinations returned promptly and discussed with the class

B41 Would you classify yourself today as an authoritarian (5), permissive (1), or in-between (2, 3 or 4) teacher

## PART C. TEACHING BELIEFS OR OPINIONS

These items have to do with your opinions or beliefs about college teaching. Rate them 5 if you strongly agree to 1 if you strongly disagree.

C 1 Good demonstrations by the teacher, with the students taking notes and solving the problem (getting the answer) are more valuable than individual laboratory work. (If not applicable mark zero)

C 2 A combination of good teacher demonstrations and individual laboratory work produce the best results. (If not applicable mark zero)

C 3 A noisy class is not necessarily a poorly disciplined class.

C 4 A few of the better, or more vocal, students often tend to monopolize class discussion. The rest sit back content. Is it to be assumed that the latter are not learning?

C 5 The teacher should make the vocal students keep quiet and force the others to talk.

C 6 Even though a student's question may sound silly or frivolous to the teacher it deserves a courteous answer.

C 7 The principal job of the college teacher should be to put across information in an organized, effective and efficient manner so that the student can get it as efficiently as possible.

C 8 The principal job of the college teacher should be to guide and stimulate the student toward a greater desire and ability for self-education.

C 9 Authoritarian teaching is best for teacher and student; it saves time for both.

C10 Permissive teaching is best for the student even though it is slower; it gives the student intellectual self-reliance and the motivation to go ahead on his own.

C11 Authoritarian and permissive teaching can be combined by the same teacher to accomplish both aims.

C12 A new college teacher tends to emulate one or more of his best professors. This should make him a good teacher.

C13 Often the new college teacher does not have the same personal qualities as his best professor(s). Emulation may make him a bad teacher.

C14 "We teach as we were taught" and are not likely to change.

C15 Most college teachers are unwilling to experiment in new, and possibly better, ways of teaching.

C16 College teachers like to regard themselves as subject matter specialists.

C17 If one knows his subject well, he can teach it well without any training in "how to teach."

C18 High school teachers know all about how to teach but little about what to teach while college teachers know all about what but little about how.

C19 Many college teachers look down on Education courses as unnecessary.

C20 Some work in appropriate Education courses would benefit college teachers.

C21 College teachers are afraid to experiment in teaching techniques for fear of being labeled Educationists.
C22 Much of the poorest teaching is done at the college level.
C23 Most college teachers lecture because they like the prestige of being an "authority" on the subject.
C24 Most college teachers lecture because they do not know of any other ways of teaching.
C25 Most college teachers lecture because they are thereby in control of the class and run less chance of exposing their ignorance.
C26 College teachers must concentrate on becoming subject matter experts.
C27 College students must have their own "built-in" motivation to learn.
C28 Student-initiated classroom activity is essential for almost all college course work.
C29 College teachers must not become concerned about students' personal or emotional problems.
C30 Remedial work at the college level should not be necessary.
C31 Frequent individual conferences with students are desirable.
C32 The fundamental goals of general education at the college level are the same for all students.
C33 Special sub-groups within classes should be formed to provide help for students with special needs.
C34 Authoritarian teaching in college is much more prevalent than permissive teaching.
C35 A college teacher has a definite obligation deliberately to motivate students to learn.
C36 Carl Rogers once said "You cannot teach, you can only learn."
C37 If a student is failing but has shown definite growth in the course he should receive a failing grade.
C38 Students who are discipline or behavior problems should be dropped from the course.
C39 It is just as important that college teaching be interesting to students as it is that it be competent in subject matter.
C40 Listening to students is as important as conveying the correct information to them.
C41 Personal friendliness between teacher and students is essential in a college class.
C42 Most college courses could be taught just as well in large sections of 100-200 students as in sections of 20-30.
C43 One of the best criteria of good college teaching is the number of worthwhile questions students ask.
C44 Every college teacher should have had some work in testing and evaluation.
C45 Every college teacher should have some cadet teaching experience under a master teacher.
C46 Every college teacher should know something about the history and philosophy of higher education in America
C47 College students must bear chief responsibility for their own failure.
C48 Frequent testing at the college level as a motivating device is not necessary.
C49 Learning should be an enjoyable experience for college students.
C50 Whether a college teacher lectures, discusses, works with small groups or uses other teaching techniques is a matter of his personal preference.

## APPENDIX B

## SUPPLEMENT I
## to
## INVENTORY OF TEACHING PRACTICES, ATTITUDES, AND BELIEFS

(This form was used only at the final workshop, May 1967. Averages of responses and per cents of changes due to project are included.)

We change as the result of more living and experience. We have probably changed as teachers during the course of this project. None, part, or all of this change may have been due to participation in the project. It is not easy to separate these two factors causing change but it is necessary to try. In statements 1 through 19 you are asked to respond in two ways. (Answers are used for the purposes of the project only.)

First: On the left indicate any change, (1 to 6) you have experienced during the time of this project by placing the appropriate number in the blank space.

Second: On the right indicate the approximate per cent (zero to 100%) of the change you can honestly attribute to participation in the project

| TOTAL CHANGE (1 to 6) | | | | | | | PART OF CHANGE DUE TO PROJECT (state in per cent, ZERO to 100) |
|---|---|---|---|---|---|---|---|

1. Awareness of what constitutes good teaching

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| (4.8) | 1 | 2 | 3 | 4 | 5 | 6 | (53%) |
| | decidedly less | moderately less | slightly less | slightly more | moderately more | decidedly more | |

2. Doing "teaching" (that which takes place after the teacher ceases to pass on information)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| (4.9) | 1 | 2 | 3 | 4 | 5 | 6 | (44%) |
| | decidedly less | moderately less | slightly less | slightly more | moderately more | decidedly more | |

3. Placing responsibility on students for their own education

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| (4.4) | 1 | 2 | 3 | 4 | 5 | 6 | (53%) |
| | decidedly less | moderately less | slightly less | slightly more | moderately more | decidedly more | |

| TOTAL CHANGE (1 to 6) | | | | | | | PART OF CHANGE DUE TO PROJECT |
|---|---|---|---|---|---|---|---|

4. Permissiveness in teaching

| (3.9) | 1 | 2 | 3 | 4 | 5 | 6 | (45%) |
|---|---|---|---|---|---|---|---|
| | decidedly less permissive | moderately less permissive | slightly less permissive | slightly more permissive | moderately more permissive | decidedly more permissive | |

5. Amount of lecturing done

| (2.6) | 1 | 2 | 3 | 4 | 5 | 6 | (66%) |
|---|---|---|---|---|---|---|---|
| | decidedly less | moderately less | slightly less | slightly more | moderately more | decidedly more | |

6. Use of discussion techniques

| (4.8) | 1 | 2 | 3 | 4 | 5 | 6 | (60%) |
|---|---|---|---|---|---|---|---|
| | decidedly less | moderately less | slightly less | slightly more | moderately more | decidedly more | |

7. Student participation in my classes

| (5.2) | 1 | 2 | 3 | 4 | 5 | 6 | (62%) |
|---|---|---|---|---|---|---|---|
| | decidedly less | moderately less | slightly less | slightly more | moderately more | decidedly more | |

8. "Involvement" of students in subject

| (4.6) | 1 | 2 | 3 | 4 | 5 | 6 | (45%) |
|---|---|---|---|---|---|---|---|
| | decidedly less | moderately less | slightly less | slightly more | moderately more | decidedly more | |

9. Relaxation of students in my classes

| (4.7) | 1 | 2 | 3 | 4 | 5 | 6 | (44%) |
|---|---|---|---|---|---|---|---|
| | decidedly less | moderately less | slightly less | slightly more | moderately more | decidedly more | |

10. My degree of relaxation in class

| (4.7) | 1 | 2 | 3 | 4 | 5 | 6 | (44%) |
|---|---|---|---|---|---|---|---|
| | decidedly less | moderately less | slightly less | slightly more | moderately more | decidedly more | |

11. Motivation of my students through their desire to learn

| (4.2) | 1 | 2 | 3 | 4 | 5 | 6 | (52%) |
|---|---|---|---|---|---|---|---|
| | decidedly less | moderately less | slightly less | slightly more | moderately more | decidedly more | |

| TOTAL CHANGE (1 to 6) | | | | | | | PART OF CHANGE DUE TO PROJECT |
|---|---|---|---|---|---|---|---|

12. My consciousness of the need to keep trying to improve my teaching

| (5.3) | 1 | 2 | 3 | 4 | 5 | 6 | (71%) |
|---|---|---|---|---|---|---|---|
| | decidedly less | moderately less | slightly less | slightly more | moderately more | decidedly more | |

13. My understanding of how students learn

| (4.4) | 1 | 2 | 3 | 4 | 5 | 6 | (55%) |
|---|---|---|---|---|---|---|---|
| | decidedly less | moderately less | slightly less | slightly more | moderately more | decidedly more | |

14. My experimentation in teaching

| (5.0) | 1 | 2 | 3 | 4 | 5 | 6 | (80%) |
|---|---|---|---|---|---|---|---|
| | decidedly | moderately | slightly | slightly | moderately | decidedly | |

15. My variation of methods of teaching

| (5.0) | 1 | 2 | 3 | 4 | 5 | 6 | (73%) |
|---|---|---|---|---|---|---|---|
| | decidedly less | moderately less | slightly less | slightly more | moderately more | decidedly more | |

16. My rapport with students

| (4.5) | 1 | 2 | 3 | 4 | 5 | 6 | (41%) |
|---|---|---|---|---|---|---|---|
| | decidedly less | moderately less | slightly less | slightly more | moderately more | decidedly more | |

17. Permanent changes in my ways of teaching

| (3.5) | 1 | 2 | 3 | 4 | 5 | 6 | (56%) |
|---|---|---|---|---|---|---|---|
| | no change | slight change | moderate change | substantial change | great change | very great change | |

18. Attitude toward the need for improving college teaching generally

| (4.4) | 1 | 2 | 3 | 4 | 5 | 6 | (71%) |
|---|---|---|---|---|---|---|---|
| | no change | slight change | moderate change | substantial change | great change | very great change | |

19. Compared with two years ago I feel that as a teacher I am

| (5.0) | 1 | 2 | 3 | 4 | 5 | 6 | (60%) |
|---|---|---|---|---|---|---|---|
| | decidedly less effective | moderately less effective | slightly less effective | slightly more effective | moderately more effective | decidedly more effective | |

Answer the following by putting the appropriate number in the space at the left.

(1 to 6)

20. Desire to participate in another project like this

| (4.5) | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| | decidedly<br>no | moderately<br>no | slightly<br>no | slightly<br>yes | moderately<br>yes | decidedly<br>yes |

21. Value of project in improving my teaching

| (5.0) | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| | decidedly<br>negative | moderately<br>negative | slightly<br>negative | slightly<br>positive | moderately<br>positive | decidedly<br>positive |

22. Effect of project in discouraging me about improving my teaching

| (4.8 | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| | decidedly<br>dis-<br>[redacted]ging | moderately<br>dis-<br>couraging | slightly<br>dis-<br>couraging | slightly<br>encouraging | moderately<br>encouraging | decidedly<br>encouraging |

23. Effect of participating in project on me as a person

| (5.2) | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| | decidedly<br>negative | moderately<br>negative | slightly<br>negative | slightly<br>positive | moderately<br>positive | decidedly<br>positive |

24. Effect of project on my department

| (4.4) | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| | decidedly<br>negative | moderately<br>negative | slightly<br>negative | slightly<br>positive | moderately<br>positive | decidedly<br>positive |

25. Effect of project on my institution

| (4.4) | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| | decidedly<br>negative | moderately<br>negative | slightly<br>negative | slightly<br>positive | moderately<br>positive | decidedly<br>positive |

26. Effect of project on changing my idea of how good a teacher I was before it started

| (4.4) | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| | decidedly<br>negative | moderately<br>negative | slightly<br>negative | slightly<br>positive | moderately<br>positive | decidedly<br>positive |

27. Desire to continue active experimentation in teaching after the project ends

| (5.3) | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| | decidedly<br>negative | moderately<br>negative | slightly<br>negative | slightly<br>positive | moderately<br>positive | decidedly<br>positive |

28. Please list the several aspects of the project in order their value to you by numbering them from 1 on. (Items of equal value may be given the same number).

| (Average rank) | |
|---|---|
| 5 | Workshop general sessions |
| 2 | Workshop group sessions |
| 6 | Seeing other teachers in action |
| 1 | Your own experiments |
| 4 | Separate group sessions |
| 2 | Getting to know people in your own field |
| 7 | Learning about other fields |
| 8 | Services of workshop consultants |

## APPENDIX C

### STUDENT EVALUATION OF COLLEGE TEACHING

(This form was used in the fall of 1965 before the experimental classes started. The results were analyzed and used largely as a pre-test to determine the "average" qualities of the participant teachers. These are discussed in Chapter III. Information concerning the status of responding students was also requested but is not included here)

Instructions for Filling out Answer Sheet

Please read all instructions before starting to answer

Your instructor is participating in a cooperative project which includes six colleges in this part of Florida. The project has to do with experimental teaching procedures for the strengthening of college teaching. You are asked here to describe your instructor in terms of certain teaching qualities. These descriptions will be used only for research purposes of the project and will in no way concern the relation of the instructor to you or to the institution.

You are asked to respond to each descriptive statement using a five point scale. If the statement strongly applies to your instructor it should be rated 5; if it is scarcely applicable it should be rated 1. Numbers 2, 3, and 4 indicate increasing degrees of applicability.

In very few cases a statement may not be applicable at all. For example, a statement concerning laboratory work in natural science would not apply to classes in other fields; a statement concerning class discussion would not apply to a straight lecture class. Do not rate statements that are clearly not applicable, but rate all others. When finished, return both document and answer sheet to the monitor.

My instructor:

1. Has few, if any, distracting ways or habits which affect his (her) teaching.
2. Has a good voice compared with other instructors.
3. Presents the subject in a well organized manner.
4. Uses considerable class time to tell stories not related to the subject.
5. Tries to get students to participate in class discussion.
6. Encourages students to raise questions in class freely.
7. Knows students in the class by name.
8. Calls students by their first names.
9. Makes the course dull by sticking too close to the textbook.
10. Makes the course "live" by applying material to practical life.
11. Is a good lecturer and uses apt illustrations.

12. Encourages students to talk directly to each other in class discussions.
13. Maintains strict discipline.
14. Makes students feel relaxed in class.
15. Mostly asks specific questions and has students recite.
16. Encourages students with unusual experience or interests related to the subject to give reports in class.
17. Demands correct use of grammar in oral and written reports.
18. Gets students to go beyond the assignments by suggesting things for further exploration.
19. Is willing to have students disagree with him (her) without their feeling that they will be penalized for it.
20. Is willing to say "I don"t know" to a question and possibly adding "but I will look it up and let you know."
21. Jokes frequently in class.
22. Is too serious in class.
23. Seems to be nervous in class.
24. Seems to enjoy the class.
25. Makes students feel it is their class.
26. Uses blackboard frequently.
27. Blackboard writing is well organized, clear, and legible.
28. Varies voice quality to avoid monotony in lectures.
29. Starts and stops the class at the appointed time.
30. Seldom covers the assigned lesson.
31. Uses sarcasm when the class is not well prepared.
32. Is sarcastic to students who give a wrong or "silly" answer.
33. Tries too hard to be funny in class.
34. Paces the lesson well to cover it within the class period.
35. Favors the bright students by letting them monopolize the class time.
36. Shows favoritism to "apple polishers."
37. Favors the opposite sex.
38. Tries to "bring out" shy students.
39. Has little time for poor students.
40. Is moody, taking out personal feelings on the class.
41. Has students gathering around his (her) desk to talk at the end of the period.
42. Teaches so that a student can get a satisfactory grade by taking careful notes without "cracking" the book.
43. Uses more than one textbook in the course.
44. Requires outside readings.
45. Uses paperbacks for parts of the course.
46. Expects students to read in appropriate current journals, magazines, news weeklies, newspapers, or monographs.
47. Requires a term paper.
48. Uses objective questions in examinations.
49. Uses essay questions in examinations.
50. Is well groomed in class.
51 Praises a student for a job well done.
52. Seems to like students as human beings.
53. Is willing to consult with and help students outside of class time.

54. Gives fair examinations.
55. Prepares examinations carefully.
56. Is a fair grader.
57. Uses frequent field trips.
58. Brings guest lecturers into the classroom now and then.
59. Uses laboratory work in science largely to verify principles developed in the classroom.
60. Uses laboratory in science as a place for students to make "discoveries."
61. Returns test papers promptly and discusses them in class.
62. Uses "pop" quizzes frequently.
63. Uses student panels, debates, or forums in class.
64. Tells students how to take good notes.
65. Tells students how to listen effectively.
66. Makes frequent use of an overhead projector.
67. Uses movies, slides, film strips, models, or other visual aids in class frequently.
68. Encourages good students to work independently and does not require them to attend class.
69. Presents to students a well prepared plan of the course at the beginning.
70. Makes clear and precise assignments.
71. Lets a student lead the class from time to time while he (she) sits back.
72. Seems to be well educated outside of and beyond his (her) own field of specialization.
73. Is interested in community, national, and international problems.
74. Seems emotionally well balanced.
75. Is always cheerful.
76. Complains about his (her) heavy teaching load.
77. Is very permissive (let's students do things their own way).
78. Is very authoritarian (insists that students do things his (her) way).
79. Seems to be worried about life.
80. Tries to put students "on their own" to discover and learn things rather than "handing it out."
81. Seems dedicated to teaching.
82. Inspires me.
83. Seems to teach merely to earn a living.
84. Is among the few best instructors I have had in college.

# APPENDIX D

## SUPPLEMENTAL FORM I
## to
## STUDENT EVALUATION OF COLLEGE TEACHING

(This form was used near the end of the first year of experimentation. It was given to both the experimental and the control section of each participant. Possible responses are on a scale of 1 to 5 and in most cases are specified as, much less, less, the same, more, and much more. The scales for such possible responses are omitted to save space, as are items 1 and 2 concerned respectively with the subject of the class and reasons for taking the course. Some selected average responses are noted and discussed in Chapter III.)

To the student:

Your instructor and you are participating in a cooperative project designed to study alternative ways of improving college instruction and learning. The project includes some 36 instructors on six campuses in the Tampa Bay area. Each participating instructor is teaching at least two sections of the same course in which the teaching procedures differ. In order to determine attitudes of students in these experimental sections we are asking the students of both sections to respond candidly to the following questions. All replies are anonymous and will be used for research purposes only.

3. How does this class compare with your other classes in the way it is taught?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| about the same | differs slightly | differs moderately | quite different | very different |

4. Are you participating more, or less, actively in your own education in this class than in others?

5. How has your attitude toward this subject changed because of the way this class is taught?

6. How do most college courses affect your attitude toward the subject of the course because of the way they are taught?

7. Are you learning more, or less, in this class than in others?

8. Are the kinds of things you are learning in this class more, or less, worth-while than in others?

9. Are the ways you are learning things in this class more or less helpful than in others?

10. Does the way of teaching this class cause you to feel more, or less, secure than in other classes in the sense of knowing what to do and when to do it?

11. Do you have to do more, or less, work in preparing for this class than for others?

12. Do you feel more, or less, comfortable in this class than in others?

13. Do you prefer a teacher who presents material in a well organized lecture or do you prefer one who expects you to do much of your own organizing and learning?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| definitely prefer lecture | prefer lecture | like both equally well | prefer to be on my own | definitely prefer to be on my own |

14. Does the way this class is taught cause you to be more, or less, independent of the teacher than in other classes?

15. Learning, and solving problems of all sorts, are things one must do for himself in the final analysis. How can a teacher be most helpful in this process?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| by lecturing | by asking questions | by having discussions | by helping students find things | by helping students develop a sense of inquiry |

16. Do you like, or dislike, the way this class is being taught?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| dislike much | dislike | neither like nor dislike | like | like much |

# APPENDIX E

## SUPPLEMENT C
## to
## STUDENT EVALUATION OF COLLEGE TEACHING

(This form is quite similar to Supplement I. It was used in the spring of 1967 near the end of the second year of experimentation. Since the procedure of the second year did not call for control sections, students were asked to compare the experimental class with others they were taking. The scale of responses was from 1 to 5 and in most items from much less to much more. Where this is the case, the scale is omitted to save space. Instructions to students were much the same as in Supplement I, Appendix D.

1. I presently rate myself in this course as doing work of about the following quality.

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| F | D | C | B | A |

2. Which of the following reasons best describes why you are taking this course

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| required | for general knowledge | for vocational or professional preparation | for creative and analytical thinking | like subject |

3. If you are taking this course because it is required which of the following attitudes would you have toward it if it were not required

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| would not take it | take it for general knowledge | would take it for vocational or professional preparation | would take it for creative & analytical thinking | would take it because I like the subject |

4. This course, compared with my other courses in the way it is taught, is

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| about the same | slightly different | moderately different | quite different | very different |

5. Compared with my other classes, the time spent in this class is

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| wasted | of less value | about the same as other classes | considerably more valuable | of much greater value |

6. Compared with my other classes my responsibilities in this class are

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| never defined | less well defined | about the same | better defined | much better defined |

7. This teacher varies his (her) teaching methods more, or less, than the teachers in my other classes

8. This class has improved my skill in creative thinking compared with my other classes

9. This class has improved my skill in analytical thinking compared with my other classes

10. I am participating more, or less, actively in this class than in my other classes

11. My attitude toward this subject has changed more, or less, favorably than has my attitude toward my other subjects

12. I feel that I am learning more, or less, in this class than in my other classes

13. I feel that the kinds of things I am learning are more, or less, worth-while, in this class than in my other classes.

14. I feel that the ways I am learning things in this class are more, or less, helpful than in my other classes.

15. I feel that I am learning to reason things out for myself better, or less well, in this class than in my other classes.

16. I do more, or less, work in preparing for this class than for my other classes

17. I feel more, or less, relaxed or comfortable in this class than in my other classes

18. I feel more, or less, secure in this class than in my other classes

19. The teacher does more, or less, talking in this class than in my other classes

20. Students generally participate more, or less, in this class than in my other classes

21. This teacher gets me involved in the subject more, or less, than do the teachers of my other subjects

22. I feel more, or less, independent of the teacher in this class than in my other classes

23. This teacher is more, or less, authoritarian in teaching methods than the teachers of my other classes

24. This teacher makes more, or less, use of teaching aids such as demonstrations, overhead projectors, etc., than my other teachers.

25. I feel more, or less, free to disagree with the teacher in this class than in my other classes.

26. The teacher in this class is a better, or poorer, lecturer than those in my other classes

27. It is harder, or easier, to get by in this class without "cracking the book" than in my other classes

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| much easier | easier | same | harder | much harder |

28. I feel that I am "discovering" things for myself more, or less, in this class than in my other classes

29. I feel that the teacher in this class, compared to my other teachers, is

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| very inferior | inferior | about the same | superior | very superior |

30. The teacher in this class makes it more, or less, "alive" by bringing in new things and ideas than those in my other classes

31. The teacher in this class inspires me more, or less, than those in my other classes

32. The teacher in this class makes me want to dig into things by myself more, or less, than those in my other classes

33. The teacher in this class is a better, or poorer, discussion leader than those in my other classes

34. The teacher in this class relies on the textbook(s) more, or less, than the teachers in my other classes

35. My learning in this class goes beyond the textbook(s) more, or less, than in my other classes

36. The lectures in this class are more, or less, repetitious of the textbook(s) than those in my other classes

37. The teacher in this class knows how to teach better, less well, than those in my other classes

38. The teacher in this class is more, or less, friendly to students than those in my other classes

39. The teacher in this class seems to know his (her) subject better, not as well, as those in my other classes

40. The teacher in this class seems to have a broader, or narrower, background than those in my other classes

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| very narrow | narrow | same | broader | much broader |

41. The teacher in this class relates the subject matter to life better, not so well, as do those in my other classes

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| very poorly | poorly | same | better | much better |

42. Good teaching is sometimes defined as that which takes place after the teacher stops transmitting information. With this definition in mind, is this teacher a better, or poorer, teacher than your other teachers

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| much poorer | poorer | about the same | better | much better |

43. Another definition of good teaching is that the teacher guides student learning. Does this teacher guide you toward your own learning better, or more poorly, than your other teachers

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| very poorly | poorly | same | better | much better |

44. Would you rather be in this experimental class than in a regular class in the same subject

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| much prefer regular class | prefer regular class | about the same | prefer experimental class | much prefer experimental class |

# APPENDIX F

## BIOLOGY SURVEY OF BASIC PROBLEMS IN TEACHING THE SUBJECT

((S) indicates problem raised by students)

### I. Problems of Teaching Methods

1. How can we present the large body of information which makes the biological sciences difficult?
    a. Comprehensive course outlines.
    b. Word derivation lists for terminology.
    c. Dictionary help with terms.
    d. Constant usage of the terms by the instructor.
    e. A good library selection of books. (May be brought into the classroom.)

2. How can we cope with the variations in the background of the students?
    a. By different "levels" of courses.
    b. By pre-testing to place the student in the correct course.
    c. By "honors Sections."
    d. We can't (An Administrative problem).
    e. By Low level "Directed Studies."

3. How can one learn all the diagrams and formulas that are necessary to Modern Biology?
    a. Extra library readings.
    b. Original sources by supplemental reading.
    c. Comparing notes with a buddy.

4. How can we help the student take notes in class?
    a. Put all our important information on the chalkboard and leave it there.
    b. Use of topic sheets handed out to the student during lecture or before the topic is covered.
    c. Write a lecture outline on the chalkboard or put on the overhead projector and leave in view of the student during lecture.
    d. Follow the textbook chapter by chapter. (Note: we recommend that this not be followed because it will cause the course to become too rigid and hence dull and uninteresting to the student. Not one biologist in the group urges this method but rather a topic coverage of the course using the text only for additional information and reference for the student.)

5. How can we help the student conquer his "fear" of science?
    a. Use of current newspaper articles before and at the end of the course. A critical review of these will provide a tremendous beginning and introduction to the lecture material.

   b. Use of magazine articles of popular interest.
   c. Use of popular books.

6. How can we help biology students form good study habits?

   a. Use of small discussion groups to put the "burden" of instruction and the passing of knowledge on to the student.
   b. Use of "key questions" and "planted" student questions in large groups.
   c. Give personal experience of the instructor.
   d. Require the class to make a list of the library books so they know what is available.
   e. "Buddy system" (pair the students off and require that they study together) or groups of students.
   f. Use of biology majors as tutors. (Paid and unpaid.)

7. What type (credit hours) general education biology courses are available?

   a. Three hours lecture with optional laboratory course.
   b. Four hour lecture - laboratory course.
   c. Three hour lecture - discussion.
   d. Three hour lecture - discussion - laboratory.

8. Should botany be taught to non-science majors from a bio-chemical approach?

   a. No.
   b. They should have the choice of either botany or zoology.
   c. No, should be required to take general education biology.
   d. There is no purpose served by the bio-chemical approach for this level student.
   e. It will kill their interest in science because they are not interested in this field. Some students may be non-science majors because they have no interest and to make them take a course in this field is defeating the purpose of the course.

9. What are some important ideas to remember in student led discussion groups?

   a. For the instructor to be silent.
   b. To let the students know what is expected of them.

10. How can the teacher keep discussion students from discussing the wrong concepts or leaving out large segments of material?

   a. To speak up to correct the error.
   b. To correct "behind the scenes."
   c. By handout sheets outlining the material to be discussed.

11. Do you think a student-written synopsis of popular and educational films to be of value?

# APPENDIX F

## BIOLOGY SURVEY OF BASIC PROBLEMS IN TEACHING THE SUBJECT

((S) indicates problem raised by students)

## I. Problems of Teaching Methods

1. How can we present the large body of information which makes the biological sciences difficult?

   a. Comprehensive course outlines.
   b. Word derivation lists for terminology.
   c. Dictionary help with terms.
   d. Constant usage of the terms by the instructor.
   e. A good library selection of books. (May be brought into the classroom.)

2. How can we cope with the variations in the background of the students?

   a. By different "levels" of courses.
   b. By pre-testing to place the student in the correct course.
   c. By "honors Sections."
   d. We can't (An Administrative problem).
   e. By Low level "Directed Studies."

3. How can one learn all the diagrams and formulas that are necessary to Modern Biology?

   a. Extra library readings.
   b. Original sources by supplemental reading.
   c. Comparing notes with a buddy.

4. How can we help the student take notes in class?

   a. Put all our important information on the chalkboard and leave it there.
   b. Use of topic sheets handed out to the student during lecture or before the topic is covered.
   c. Write a lecture outline on the chalkboard or put on the overhead projector and leave in view of the student during lecture.
   d. Follow the textbook chapter by chapter. (Note: we recommend that this not be followed because it will cause the course to become too rigid and hence dull and uninteresting to the student. Not one biologist in the group urges this method but rather a topic coverage of the course using the text only for additional information and reference for the student.)

5. How can we help the student conquer his "fear" of science?

   a. Use of current newspaper articles before and at the end of the course. A critical review of these will provide a tremendous beginning and introduction to the lecture material.

a. Only for the films on classical biology.
b. It would be better to provide a handout sheet giving the synopsis to the students before the films are shown.
c. Give a study guide for all films in the first week of the term .

12. What are some ways of getting student led discussions started?

    a. Telling the students frankly that the burden of learning is on them and they have to study for this type of class.
    b. By gradually working into it with teacher led discussions.

13. What are some hints on the discussion method in teaching? (Student-led Discussion)

    a. Physical Room Arrangements

        1. chairs in a circle
        2. the instructor should not sit in the circle
        3. a library cart on wheels for reference books and articles
        4. available chalk board
        5. informality should be the rule (cokes and smokes)

    b. Instructor

        1. provides a general outline to follow so the same material is covered
        2. provides books, specimens, articles, films, etc.
        3. should not answer more than 50% of the direct questions. Should refer students to the reference books and the library.
        4. should deal with individual problems.
        5. gives tests and hands out sheets
        6. will set the tone of the whole group
        7. doesn't participate in the discussion (hard to stay out)

    c. Students

        1. bear the burden of learning themselves
        2. some rebel (deal with privately and individually)
        3. some shy " "
        4. some lazy " "
        5. The class may cover unimportant items to the instructor or go down the wrong path. This also must be dealt with.

## II. Problems in teaching Biology

1. What is a good experiment for teaching Photosynthesis in the Laboratory?

- a. Standard starch test on leaves grown in Light and those grown in the Dark.
- b. Plant pigment separation by chromatography.
- c. Evolution of oxygen by Elodea in water.
- d. Measurement of sugar produced.

2. How much chemistry is needed for an understanding of the significance of Photosynthesis, Respiration, protein synthesis, etc., in a general education biology course?

   - a. None
   - b. Introduction to inorganic and deeper into organic
   - c. As much as the students will absorb
   - d. No inorganic and a lot of organic
   - e. As is needed only when the various topics are discussed.

3. How can we demonstrate the results of gene action in lecture?

   - a. use of PTC taste test papers
   - b. use of thiourea or sodium benzoate taste test papers
   - c. probability can be demonstrated by coins, dice,hand raising, etc.
   - d. use of human characteristics, i.e.
     - a. widows peak
     - b. tongue rolling
     - c. lobed ears
     - d. hand clasping

4. How can we demonstrate the results of gene action in the laboratory?

   - a. Results only of previous tests
   - b. Experiments on:
     - a. Albino vs. chlorophyllous corn
     - b. Drosophila
     - c. Rabbits
     - d. Neurospora

5. When should the genetics block of information be included in the course?

   - a. Before evolution
   - b. Right after Cell structure
   - c. With DNA action and protein synthesis
   - d. At the very first
   - e. At the end

6. How can we differentiate between mitosis and meiosis when discussed together in lecture?

   - a. Use of movies
   - b. Use of transparencies in the overhead projector
   - c. Use of models
   - d. Use of large "pop beads"

7. What should be stressed in life cycle of plants and animals?

   a. The evolutionary trend and the adaptive value of the diplophase
   b. Only the general life cycle of higher and lower plants and humans
   c. The practical aspects
   d. The ecological value
   e. Only the life cycles of plants, humans, and human parasitic organisms should be covered.

8. How can we differentiate between haplophase and diplophase?

   a. Diagram on the board
   b. Autio-visual aids
   c. Use the life cycle to do this pointing out the difference between vegetiative division (Mitosis) and reduction division (Meiosis)

9. Should air and water pollution be covered?

   a. Yes
   b. No
   c. Only as it effects men
   d. In great detail

10. What section of the course material should air and water pollution be included with?

    a. By itself at the end
    b. Under national resources
    c. With conservation
    d. With ecology and energy flow
    e. With human ecology

11. How can we reduce the "radical change" between college and high school biology?

    a. Wait for the BSCS program to take effect
    b. We can't because this is in the domain of the county (state) school system
    c. Extra readings in the library which are suggested by the local high school biology teachers.

12. Problem of understanding difference between mitosis and meiosis. (S)

    a. Use of overhead transparencies
    b. Pop beads

13. Insofar as life cycles of plants and animals are concerned, what should be stressed in a general education biology course?

   a. Evolutionary trend from primitive to advanced plants has been in direction of diplophase and suppression of haplophase. Most animals, diplophase is dominant. Significance related to adaptive value of diploid vs. haploid.

14. Difficulty understanding in life cycle difference between haplophase and diplophase. (S)

   a. Use of Modes

15. What is the difference between hypertonic and hypotonic solutions? (S)

   a. Use visual aid showing relative concentrations of solutes to water.

16. Difficulty in understanding relationship of light reactions to dark reactions in photosynthesis. (S)

   a. Use of diagram to show end product of light reaction and how it relates or where it enters what is called the dark reaction.
   b. Scientific American Reprint, "How Cells Transform Energy."
   c. "Plants" An introduction to Modern Botany, Grulach and Adams (Wiley) -
   d. Handbook for Biology Teachers, Schwab

17. What is mass action? (S)

   a. Example of losing weight or gaining weight

      fats → fatty acids + glycerol

   b. Good account in Elliott, Zoology

18. Why won't cytochrome system (aerobic respiration) operate without oxygen? (S)

   a. Example of bases loaded in baseball game. Unless man on third is removed, men on first and second can't move on to next base.
      Same true with hydrogen.
   b. Scientific American reprint
   c. Compare this to a machine. A sequence of patterns required.

19. How is bond energy explained?

   a. by making a statement to clarify and simplify
   b. have students research the chemistry books

20. How can we distinguish between centrisome and centrioles?

   a. by structure
   b. by function
   c. by definition (the centrosome is a useful collective term for the centrioles?

21. Recombinations and finding the $F_2$. When and when not should the same letters be put together. (S)

   a. Life series Evolution dealing with neiosis and gamete formation for eye formation.
   b. Punnett Square dealing with letters etc.

22. How is it possible to have three alloles for the same trait? This appeared on the examination and I did not understand it. (S)

   a. Show chromosomes

23. Don't completely understand linkage and chromosomal process of division. (S)

   a. Large pop beads
   b. remove math
   c. compare linkage with independent assortment

24. Relationship between genes and chromosomes. (S)

   a. Leave DNA alone
   b. Stop to explain more slowly

25. Should population control be included in a general education biology course? Where?

   a. In a discussion of human reproduction
   b. In a section of "Practical ecology"
   c. In a section on expanding population (back to Malthus)
   d. It should not be covered at all because it isn't the province of general biology to teach this controversial subject.

26. What is the Department (College) Policy in relation to the laboratory requirements? Which students should have the laboratory experience?

   a. All science majors should have 8 hours of Biology with laboratory. All non-science majors should be exposed to one laboratory experience either in college or high school.
   b. Students are counseled into laboratory only after review of their past academic record.
   c. The laboratory is the essential part of a biology course and all students must take it.

**27. How are the text and laboratory manual chosen for a general education biology course?**

**a. By the Department Head**
**b. By the faculty writing their own**
**c. By the individual placed in charge of the course in consultation with others in the department who will also teach the course.**
**c. By a committee of instructors**

# APPENDIX G

## INVENTORY OF STUDENT ATTITUDES AND BELIEFS REGARDING LITERATURE

Directions: These statements have to do with your attitudes and beliefs about literature. Please rate them all in the same way.

5 - if you strongly agree
4 - if you agree
3 - if you are not sure
2 - if you disagree
1 - if you strongly disagree

Please indicate your sincere feeling, not what you think your literature teacher would like you to answer.

1. Literature is helpful in other subject areas.
2. Literature is an enjoyable subject.
3. Some literature should be required of all college students.
4. From my experience, short stories and novels are completely different.
5. Most literature teachers are perfectly normal people.
6. You cannot "argue" with a literature teacher. (The teacher is always right.)
7. Frequently, in literature classes, I am so lost that I cannot even muster up an intelligent question to ask.
8. Literature is better understood if it is taught at a slower pace so that you can actually understand certain areas better.
9. I have the feeling that the questions that I would like to ask are rather "stupid."
10. Discussing a literary idea with a friend is an enjoyable thing to do.
11. Literature is fun.
12. I would be disappointed if my own children did not enjoy literature.
13. The main purpose in literature is to get the right answers to assigned questions.
14. Literature is more interesting when outside reading is done in areas related to the one being studied.
15. The thought of taking a literature course after this one is unpleasant to me.
16. I would never think of becoming a literature teacher.
17. Students who like literature are slightly odd.
18. The atmosphere in most literature classes is cold and lifeless.
19. Typically, literature teachers are not always sure what they are talking about.
20. As little time as possible should be spent on literature assignments.
21. Students are not allowed to express their own ideas in literature class.
22. Literature teachers are usually unfair in giving partial credit.
23. Literature teachers usually carry on the class discussion with a very few students and leave the rest "out of things."

24. I never discuss literary ideas outside of class.
25. Frequently, literature teachers show a lack of imagination in their explanations.
26. I would read suggested supplementary materials even though I knew I would receive no extra credit.
27. Home and personal problems have affected my progress in literature.
28. Literature teachers are not understanding of students' problems with literature.
29. Literature grades reflect one's true ability in literature.
30. Literature will be of value in my proposed major.
31. Literature is of value to the average housewife.
32. I find working with literature a boring chore.
33. Introduction to literature should not be required for graduation.
34. Literature instructors tend to belabor tedious points while neglecting the more important matters for consideration.
35. Being a good student of literature depends basically on how well one can learn gimmicks.
36. The reading of literary history is as stimulating as the reading required in other subjects.
37. Additional reading of literature can serve as a good punishment for elementary children when they misbehave.
38. Literature is not an exact science constructed logically upon basic assumptions.
39. Literature is a game in which a person plays by making his own rules and abiding by them once they are made.
40. I find an indirect benefit in the study of literature in that it provides a logical way of thinking that carrys over into solving the problems of everyday life.
41. My usual attitude with respect to literature is to "endure" it and save my time for more important subjects.
42. Literature teachers,in general, are so wrapped up in literature that they tend to exaggerate its importance.
43. Usually, I find it difficult to keep my mind on the literature studied in class.
44. I would really like to know how to study literature better.
45. I wish I knew more about using the library to study for my literature class.
46. Taking notes in literature class is difficult.
47. Reciting in literature class makes me very nervous.
48. Studying for literature class takes entirely too much time.
49. My school does not offer enough literature classes.
50. I simply do not like to study literature.
51. Most of the time I get sleepy in literature class even when I've had enough sleep at night.
52. I wish I could quit my literature class right now!
53. Keeping my mind on what goes on in literature class is a chore.
54. Literature class periods are not well organized.
55. My literature teacher doesn't understand me.

# APPENDIX H

## INVENTORY OF STUDENT ATTITUDES AND BELIEFS IN MATHEMATICS

Directions: These statements have to do with your attitudes and beliefs about mathematics. Please rate them all in the same way:

5 - if you strongly agree
4 - if you agree
3 - if you are not sure
2 - if you disagree
1 - if you strongly disagree

Please indicate your sincere feeling, not what you think your teacher would like you to answer.

1. Math is helpful in other subject areas.
2. Math is an enjoyable subject.
3. Some math should be required of all college students.
4. You cannot "argue" with a math teacher. (The teacher is always right.)
5. Frequently in math classes I am so lost that I cannot even muster up an intelligent question to ask.
6. I have the feeling that the questions that I would like to ask are rather "stupid."
7. Discussing a mathematical idea with a friend is an enjoyable thing to do.
8. I would be disappointed if my children did not enjoy math.
9. The main purpose in math is to get the right answers to assigned problems.
10. Math is more interesting when outside reading is done in areas related to the one being studied.
11. The thought of taking a math course after this one is unpleasant to me.
12. I would never think of becoming a math teacher.
13. The atmosphere in most math classes is cold and lifeless.
14. I never discuss mathematical ideas outside of class.
15. I would read suggested supplementary materials even though I knew I would receive no extra credit.
16. Mathematics will be of value in my proposed major.
17. I find working mathematics a boring chore.
18. Being a good mathematician depends basically on how well one can learn "gimmicks."
19. The reading of Mathematics history is as stimulating as reading required in other subjects.
20. Mathematics is an exact science constructed logically upon basic assumptions.
21. I find an indirect benefit in mathematics in that it provides a logical way of thinking that carries over into solving the problems of everyday life.
22. My usual attitude with respect to mathematics is to "endure" it and save my time for more important subjects.

23. The order and exactness of mathematics fascinates me such that I enjoy "toying" with new problems.
24. Mathematics teachers in general are so wrapped up in mathematics that they tend to exaggerate its importance.

# APPENDIX I

## PHYSICAL SCIENCE GROUP

## OBJECTIVES OF LABORATORY INSTRUCTION

Objectives that may be achievable through use of "lecture experiments":

Better understanding of the role of experiments in the development of science, through experience in the planning and interpretation of genuine experiments.

Acquaintance with some of the tactics used in the scientific approach to problems, e.g., use of "experimental controls."

Skill in the use of graphs, for discovering scientific laws as well as for illustrating the nature of quantitative relationships.

Realization of the inevitability of "experimental errors," knowledge of the nature of their effects, and ability to take possible errors into consideration when interpreting the results of an experiment.

Appreciation of the extent to which simple measurements can be made accurately, and a sense of satisfaction in an experiment well done.

Acquaintance with some scientific activities that are involved in some science hobbies.

Appreciation of the need for a quantitative approach to certain types of scientific problems.

### Suggested Policy for Selecting and Planning Lecture Experiments

Lecture experiments should be selected and planned primarily for their value in accomplishing the general objectives given above, and only secondarily for the purpose of teaching facts and principles.